Acta Scientific Dental Sciences (ISSN: 2581-4893)

Volume 5 Issue 4 April 2021

Research Article

Evaluation of Oral Health Knowledge Among Type II Diabetes Mellitus Patients and the Effect of Phase I Periodontal Therapy on Glycemic Status of the Individuals

Sheela Kumar Gujjari[1], Rishika Battula[2]*, Kunchok Dolma[3] and Sindhu Gujjari[4]

[1]HOD and Professor (MDS), Department of Periodontology, JSS Academy of Higher Education and Research, Mysuru, India

[2]PG Student (BDS), Department of Periodontology, JSS Dental College and Hospital, Mysuru, India

[3]Department of Periodontology, JSS Academy of Higher Education and Research, Mysuru, India

[4]JSS Medical College, JSS Academy of Higher Education and Research, Mysuru, India

***Corresponding Author:** Rishika Battula, PG Student (BDS), Department of Periodontology, JSS Dental College and Hospital, Mysuru, India.

Received: February 04, 2021

Published: March 09, 2021

Abstract

Background: Periodontal disease and diabetes share a bidirectional relationship and inflammation plays a pivotal role in both. Diabetes causes various complications and periodontal disease has been established as the 6th complication. Integration of qualitative research into intervention studies is becoming popular as the qualitative research can be used to understand the people's belief, experiences, attitudes, behaviours and interactions thereby enhancing the understanding of the research query. Thus, this study involved a mixed research which helped to assess the knowledge, attitude and practice among diabetics and used an intervention to assess the glycemic control which not only treated the patients but helped in motivating and educating them on the importance of oral hygiene and glycemic control.

Objective: To evaluate oral health knowledge and its relationship to Type II Diabetes Mellitus among diabetic patients and the effect of Phase I periodontal therapy on glycemic status of these individuals.

Methods: It is a questionnaire based interventional study carried out in outpatient department of Periodontology, JSS Dental College and Hospital, Mysuru. A total of 79 diabetic patients were enrolled by purposive sampling. Clinical parameters and glycemic status were evaluated at baseline and 3 months after phase I periodontal therapy. A pretested questionnaire was filled by the patients to assess their knowledge, attitude and practice. Paired sample't' test and Pearson correlation test was done to evaluate the relationship between the periodontal parameters and glycemic status of the patients.

Results: The prevalence of diabetes was found to be more in males (30%) with an age group of 41-50 years. The awareness and knowledge of diabetes and its risk was found to be low among the participants but was found to be the highest among the participants with higher literacy rate. Statistically significant reduction was noted in bleeding on probing (BOP), pocket probing depth (PPD) and glycated haemoglobin levels (HbA1c) at 3 months when compared to baseline. ($p<0.05$)

Conclusion: Lack of knowledge regarding the risk and complications of diabetes in systemic and oral health as well as the effect of periodontal therapy on glycemic control was noted. The Periodontal therapy helped to reduce not only the periodontal inflammation but also improved the glycemic control.

Keywords: Glycated Hb (HbA1c); Diabetes; Knowledge; Awareness; Periodontal Therapy

Introduction

Diabetes has become a global threat and India has topped the world with the highest number of diabetes. India has 41 million diabetics and this number is expected to increase to 70 million by 2025 [1]. An association between diabetes mellitus and periodontitis dates back to 1960s where it has been seen that periodontitis is more prevalent in diabetics than non-diabetics. Diabetes mellitus is one of the risk factors for the severity and progression of gingivitis and periodontitis. Alveolar and periodontal destruction is seen more in the poorly controlled diabetics which has been attributed to vascular changes like gingival microangiopathy and elevation of serum pro-inflammatory cytokines. Periodontitis is an inflammatory and immuno-modulatory disease of the supporting structures of the tooth which is characterized by the release of various inflammatory mediators like tumor necrosis factor α (TNFα), Interleukin (IL) 1β, IL-8, IL-10, Prostaglandin (PG) E_2, C-reactive protein (CRP) and matrix metalloproteinases (MMP-8, MMP9 and MMP-13) which further induce and elevate systemic chronic inflammatory state [2]. These mediators play a role in insulin resistance, thereby contributing to hyperglycemia. As inflammation is the common link between the two diseases, periodontal treatment can improve periodontal status as well as insulin sensitivity leading to a good glycemic control and hence, prevent their complications. A recent meta-analysis has shown that non-surgical method of treating periodontitis has an adjuvant effect in reducing glycated hemoglobin (HbA1c) [3]. Hence, the basic treatment for periodontitis such as mechanical and chemical plaque control by the individual or professionally must be emphasised. A qualitative approach holding one to one interview helps to understand the awareness of the diabetic individuals to the problem and a quantitative approach helps to educate and motivate by showing them the improvement in oral manifestations and glycemic control. Patient education is the stepping stone in the management of diabetes. The dentist's role is vital in recognizing the oral signs of diabetes in an undiagnosed case as well as in a known case. Also, physicians who diagnose the case only stress on the systemic complications. Thus, a collaborative team work between dentist and physician would go a long way to reduce the complications of diabetes of which periodontitis is one of them. So, the aim of this study was to evaluate oral health knowledge among type II diabetic mellitus patients and the effect of phase I periodontal therapy on glycemic status of the individuals.

Material and Methods

This is a questionnaire based interventional study which was conducted on 79 Type II diabetic patients in the age group of 35-60yrs presenting to Department of Periodontology, JSS Dental College and Hospital, Mysuru. The duration of the study was for 12 months. The study was approved by the institutional ethical committee. Sample size was calculated using a software (n Master software) and found to be 79 with an alpha error of 1% and power 90%. Out of which 39 patients were lost to follow up and some developed complication. Hence, a total of 40 patients were assessed. Inclusion Criteria: Patients diagnosed with Type II Diabetes Mellitus of duration minimum 6 months within the age group of 35-60 years, both males and females were assessed; patients who were willing and gave informed consent. Exclusion Criteria: Pregnant and lactating females, patients having <20 teeth in their oral cavity were excluded; also, patients with diabetic complications (diabetic nephropathy, retinopathy, nephropathy); Smokers and patients with mental or physical disability were excluded.

Questionnaire design: A structured closed ended questionnaire was designed in 2 languages (English, Kannada). The questionnaire was verbally explained in local language to illiterate participants and those facing problem in understanding it. Questionnaire was checked for validity and reliability. It included data regarding demographic profile and questions pertaining to knowledge regarding the disease and oral health practices.

Clinical parameters: Periodontitis was assessed using Community periodontal index (CPI) using WHO criteria by a single examiner.

Haematological parameter

Glycemic status of Type II diabetic patient was also evaluated taking HbA1C as criteria at baseline and also after 3months following the phase I therapy which includes scaling and root planing.

Written consent was obtained from the patients before conduction of the study and confidentiality was maintained.

Result

A total of 40 patients were finally assessed in this study, out of which 10 were females (25%) having a mean age group of 51.7 ± 5.5 and 30 were males (75%) with a mean age group of 52.1 ± 11.4. The prevalence of diabetes was found to be more in males (30%) with an age group of 41-50 years (Figure 1).

Knowledge about the disease

The mean knowledge score among the participants was found to be 2.25 ± 1.44. Education level of the participants varied from illiterates to university education with majority belonging to the latter group (35%). Correlation of education with knowledge re-

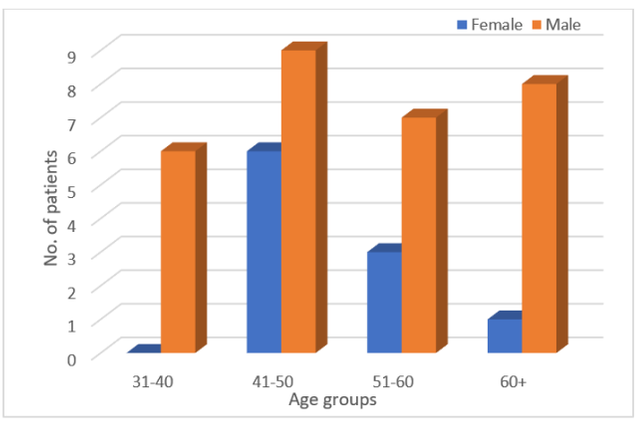

Figure 1: Distribution of diabetic patients according to their age.

garding the disease revealed that the illiterates had a significant lack of knowledge compared to the graduate level education or more (Figure 2).

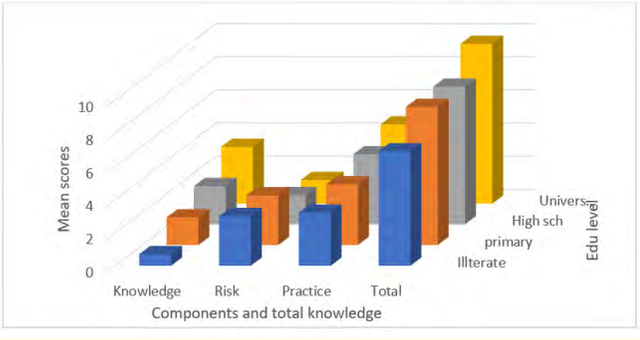

Figure 2: Mean scores of patients regarding their knowledge in relation to their literacy rate.

Duration of diabetes

The duration of diabetes among the participants ranged from <1 year to >20 years with a majority belonging to 2 - 5 years (42.5%). When asked about the type of diabetes majority (75%) knew about the type of diabetes.

Knowledge regarding the risk factors

The mean knowledge score regarding the risk factors was found to be 2 ± 1.29. The percentage of patients that had knowledge about the risk factors was low among the participants and found to be the higher among the participants with higher literacy rate i.e. university education (35%).

Practice score

The mean oral health practice score was found to be 4.1 ± 0.93. The level of oral health practice was found to be good among 12 patients (30%), most of which were literate participants.

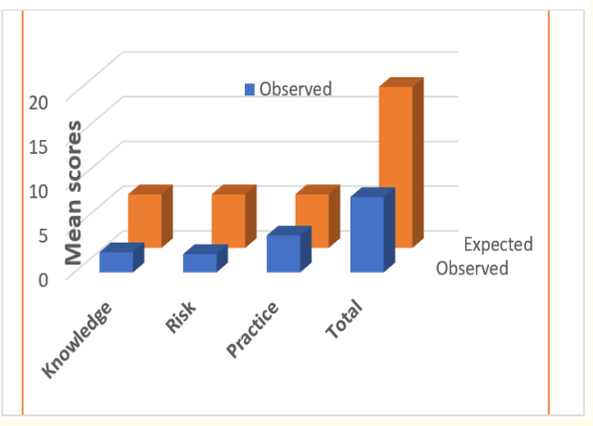

Figure 3: Mean scores of patients regarding knowledge of the disease, risk factors of the disease and oral health practices.

Source of information

Most participants mentioned that the source of information on diabetes and its complications was known from their doctors and only 10% obtained their knowledge from the internet (Figure 4).

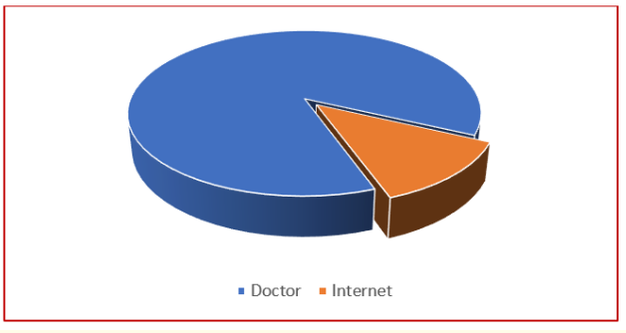

Figure 4: Source of information for the patients.

Clinical parameters

Bleeding on probing (BOP), probing depth (PD), Clinical attachment level (CAL) were measured at baseline and 3months and a

significant ($p < 0.05$) decrease in all these clinical parameters were noted when compared from baseline to 3months (Table 1).

Clinical/ Biochemical parameter	Baseline (n = 40) Mean SD	3 months (n = 40) Mean SD	P value
Bleeding on probing	0.48 0.15	0.38 0.13	0.01
Probing Depth	0.29 0.19	0.24 0.18	0.01
CAL	0.50 0.33	0.45 0.30	0.01
HbA1c	7.79 1.73	7.2 1.11	0.01

Table 1: Levels of clinical parameters (BOP, CAL, PPD) and HbA1c levels at baseline and 3 months.

Hematological parameter

HbA1c values were assessed before and 3 months after phase I therapy. A significant reduction was noted in the values from baseline 7.79 ± 1.73 to 7.2 ± 1.11 at 3 months.

Statistical analysis

Scores were calculated according to the options selected by the participants. The data was analysed using the statistical analysis software SPSS version 22. The individual scores were summed up to yield a total score. Descriptive statistics was calculated and mean scores, standard deviation, frequency distribution and percentage were obtained. The variation of the scores from illiterates to literates regarding knowledge of disease, knowledge of risk factors, oral health practice was analysed using one-way ANOVA test. The difference in the clinical parameters such as BOP, CAL, PPD and also glycated haemoglobin levels (HbA1c) before and after the phase I therapy were assessed using paired Student's *t*-test. The level of significance was set at $p \leq 0.05$.

Discussion

Even though there are studies carried out to assess the knowledge, awareness and association of diabetes mellitus on oral health. There are no interventional studies done along with evaluating their knowledge of the effect of periodontal therapy on glycemic control. Therefore, this study has integrated both the qualitative and quantitative research which would add a new dimension that cannot be obtained through measurement of variables alone as the qualitative research can be used to understand the people's belief, experiences, attitudes, behaviours and interactions thereby enhancing the understanding of the research query.

The primary outcome of the study was to evaluate oral health knowledge among Type II Diabetes Mellitus patients by using a validated questionnaire which addressed their knowledge, practice and attitude. The prevalence of diabetes was found to be more in males (30%) with an age group of 41- 50 years and the majority's duration of the diabetes was 2-5yrs. The prevalence of diabetes in the near future is suspected to be increased upto 70 million by 2025, simultaneously periodontitis prevalence might also be affected as it is considered as the 6th complication of diabetes. The knowledge of this relationship is limited among individuals as seen by various studies [1,4].

In this study, the mean knowledge score in the participants was found to be 2.25 ± 1.44 and the correlation of education with knowledge regarding the disease revealed that the illiterates had a significant lack of knowledge compared to the graduate level education or more. A similar study conducted by Shruthi., *et al*. [5], which also reported that participants below secondary school education and lower duration of diabetes mellitus were significantly associated with lack of knowledge [5].

Bhumika., *et al*. [6] found that only 24% of the subjects were aware of the oral complications due to diabetes in her study. Similarly, in this present study, it was found that only 35% percentage of patients had knowledge about the risk factors and among which most of them have higher literacy rate.

The educational status had a significant association with good knowledge, attitude and practices which might be because educated participants are able to read necessary information easily when compared to illiterates which is in par with other studies done by Rahaman KS., *et al*. (2017) [7].

Majority of the patients (90%) were aware of their type of diabetes and got the information regarding their diabetic status from the physician whereas 10% came to know through the internet sources. This shows that the point of contact is mainly the general physician. Studies done by Masood., *et al*. [8] and Bangash., *et al*. 2011 [9] have shown that patients with diabetes mellitus are more aware of the systemic complications than the oral complications due to the information provided by the physicians.

Although not commonly discussed, uncontrolled diabetes mellitus is associated with increased risk of developing periodontal disease which can be assessed using clinical parameters such as PPD, BOP and CAL. In this study, statistically significant reduction ($p < 0.05$) was noted in BOP, PPD, CAL and HbA1c levels at 3 months (after SRP) when compared to baseline. Scaling and root planing helped to reduce the glycated hemoglobin level among diabetic patients as well as improved the periodontal conditions. This marked

improvement might be due to the reduction in the gingival inflammation, decrease in the inflammatory mediators like TNF a, IL-1b which would have improved the insulin sensitivity after periodontal therapy [10].

A systematic review and meta-analysis done by Amare., *et al*. (2017) [3] resulted that there was a significant reduction of HbA1c and FBS following mechanical periodontal therapy in type 2 diabetes mellitus which is in par with this study. Similarly, a study conductedby Goel., *et al*. (2017) [2] stated that nonsurgical periodontal therapy may have a beneficial effect on HbA1c level in moderately controlled type 2 diabetic patients.

Conclusion

This study proved that the periodontal therapy helps to reduce not only the periodontal inflammation but also improves the glycemic control. It also showed that there is a lack of knowledge regarding the association of oral health and diabetes among the diabetic patients. Dentists and physicians have an important role to play in improving the patient's health screening must be encouraged by the physicians among the diabetic patients. This multidisciplinary approach would help to improve the quality of life thus, reducing the economic burden as diabetes is a raising menace affecting the global health.

Bibliography

1. Sicree R., *et al*. "Prevalence and projections". In: Gan D (ed.). Diabetes Atlas International Diabetes Federation, 3rd edn. International Diabetes Federation, Brussels, Belgium, (2006): 16-104.

2. Goel K., *et al*. "Effects of nonsurgical periodontal therapy in patients with moderately controlled type 2 diabetes mellitus and chronic periodontitis in Nepalese population". *Clinical, Cosmetic and Investigational Dentistry* (2017): 9.

3. Amare Teshome and Asmare Yitayeh. "The effect of periodontal therapy on glycemic control and fasting plasma glucose level in type 2 diabetic patients: systematic review and meta-analysis". *BMC Oral Health* 17 (2017): 31.

4. Gupta S., *et al*. "Evaluation of oral health knowledge, attitude, and practices among diabetics in a northern union territory of India". *Indian Journal of Dental Sciences* 9 (2017): 148-152.

5. Shanmukappa SM., *et al*. "Knowledge, attitude and awareness among diabetic patients in Davanagere about the association between diabetes and periodontal disease". *Journal of International Society of Preventive and Community Dentistry* 7 (2017): 381-388.

6. Sehdev B., *et al*. "Knowledge, Attitude and practice among diabetic patients towards oral health at Ayder referral hospital in age range between 18 and 60 years". *International Journal of Dentistry and Oral Health* 1.1 (2019): 1-5.

7. Rahaman KS., *et al*. "Knowledge, attitude and practices (KAP) regarding chronic complications of diabetes among patients with type 2 diabetes in Dhaka". *International Journal of Endocrinology and Metabolism Research* 15 (2017): e12555.

8. Shabeen Masood., *et al*. "Beliefs of people with diabetes about shin prick during Ramadan fasting". *American Diabetes ASS* 37.4 (2014): e68-69.

9. Bangash RY., *et al*. "Diabetic patients level of awareness about oral health knowledge, attitude and practices". *Pakistan Oral and Dental Journal* 31 (2011): 292-295.

10. Kiran M., *et al*. "The effect of improved periodontal health on metabolic control of type 2 diabetes mellitus". *Journal of Clinical Periodontology* 32.3 (2005): 266-272.

11. Azizah., *et al*. "Public knowledge and awareness of the effect of diabetes mellitus on oral health". *Australian Medical Journal* 11.1 (2018): 509-518.

12. Prakash Poudel., *et al*. "Oral health knowledge, attitudes and care practices of people with diabetes: A systematic review". *BMC Public Health* 18 (2018): 577.

13. Rani SBB., *et al*. "Does glycemic status influence quality of life of Type II Diabetic patients: an explorative study in Mysuru". *International Journal of Community Medicine and Public Health* 4 (2018): 59-64.

14. Gay I., *et al*. "The effect of periodontal therapy on glycemic control in a Hispanic population with type 2 diabetes: a randomized controlled trial". *Journal of Clinical Periodontology* 41.7 (2018): 673-680

15. Preshaw PM., *et al*. "Periodontitis and diabetes: A two-way relationship". *Diabetologia* 55 (2012): 21-31.

16. Hussain R., *et al*. "Knowledge and awareness about diabetes mellitus and diabetic retinopathy in suburban population of a South Indian state and its practice among the patients with diabetes mellitus: A population-based study". *Indian Journal of Ophthalmology* 64 (2016): 272-276.

17. Janket SJ., *et al*. "Does Periodontal Treatment Improve Glycemic Control in Diabetic Patients? A Meta-analysis of Intervention Studies". *Journal of Dental Research* 84.12 (2005): 1154-1159.

18. Eric Mario Shailander A., *et al*. "Influence of Glycemic Status on Periodontal Condition and Specific Periodontal Pathogens in Controlled and Uncontrolled Diabetics Before and After SRP". *Acta Scientific Dental Sciences* 2.10 (2018): 02.

19. Singh S., *et al*. "The effect of periodontal therapy on the improvement of glycemic control in patients with type 2 diabetes mellitus: A randomized controlled clinical trial". *International Journal of Diabetes in Developing Countries* 28.2 (2008): 38-44.