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Oral health problems related to pre- and post- medications among diabetic individuals: A cross sectional study

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Abstract

Background of the study: Diabetes is a complex metabolic disorder most often causes change in normal oral flora due to hyperglycemia and instabilities in healing processes of damaged mucous membranes as a result of decreased salivation, immune function and changes in dietary habits.

Aim: The aim of the present cross sectional study design is to evaluate the various oral health problems encountered by diabetic individual's pre and post medications.

Materials and Method: A descriptive cross sectional study was conducted in which a close-ended, self-administered 10 item-questionnaire was distributed randomly among 100 diabetic individuals under medication. Fasting and Random blood sugar levels were collected from their recent medical reports after obtaining their consent.

Results: On evaluating the demographic data, the mean age was found to be 49.8 years with predominant participants belonging to 41- 50 yrs (33%) followed by 51-60 yrs (30%) category and presented with Oral health problems such as pain (82%), tooth decay (94%), gum diseases (6%), dry mouth (93%) often with (15%) or without loss of sensation (85%).

Conclusion: From the above study it was observed that most of the diabetic patients feel there is a significant relation between diabetes with oral health problem and also noticed significant changes in their oral cavity after diabetes medications can influence their quality of life.

Keywords: Dry mouth, fasting blood sugar, gum disease, oral health, diabetes

1. Introduction

Diabetes mellitus is one of the most prevalent endocrine disorders that influence oral health of patients. India heads the world with about 62.4 million people having diagnosed with diabetes in 2011 [1]. In 2014, the global prevalence of Diabetes was estimated to be 9% and almost 1.6 million deaths worldwide were caused directly by Diabetes in 2015 [2]. As a result, the International Diabetes Federation (IDF) published the "guideline on oral health for people with diabetes" in 2009, which encourages execution of oral care in diabetes care. Over the years numerous studies establishing the relationship among diabetes mellitus, gingival and periodontal health associated with loss of tooth, dry mouth, dental caries have been broadly reported. There is an abundant evidence of the biological and epidemiological links between periodontal disease state and diabetes [3, 4]. One of the first studies to conclude an association between periodontitis and diabetes was conducted among Pima Indians [5]. Majority of these studies into oral complications in patients with DM from the limited perspective of elevated blood glucose levels showed dry mouth, loss of teeth, periodontal diseases and ill-fitting prosthetic appliances influence systemic health and also impact the quality of life of patients [6].

DM is a risk factor for periodontal disease that affects its prevalence and incidence, and the degree of periodontal tissue destruction is determined by the level of metabolic control and the duration of DM. The prevalence of periodontitis is high (34%-68%) in diabetic patients, and deep pockets and attachment loss are common in patients with poorly controlled diabetes [7]. The risk of alveolar bone loss is 11 times higher among patients with poorly controlled diabetes compared to healthy individuals [8]. Despite this, oral health remains an under-recognized and neglected global health issue especially among diabetic individuals. Given the liability of oral diseases and their association with diabetes, there is a strong

pathophysiological basis for establishing oral health problems within general healthcare practice [9, 10]. Health promotion through the encouragement of a healthy diet, good oral hygiene habits and the metabolic control of diabetes must start at an early age, and the dentist play a vital role in preventing complications as a result of poor diabetic control. The present study was aimed to evaluate the various oral health problems encountered by diabetic individual's pre and post medications and also to understand major changes in their oral cavity after diabetes medications.

2. Materials and Methods

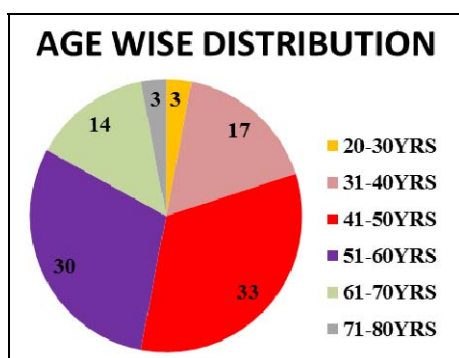
A descriptive cross sectional study was conducted in which a close-ended, self-administered 10 item-questionnaire was distributed randomly among 100 diabetic individuals under medication. Fasting and Random blood sugar levels were collected from their recent medical reports after obtaining their consent. Demographic data including age, gender were recorded followed by Questionnaire filled by the surveyed subjects.

3. Statistical Method

Descriptive analysis for age followed by gender based on their distribution was performed. Inferential statistics using Chi-square goodness of fit test was done to check the level of significance and association between variables for the entire questionnaire. All the data were processed using the SPSS statistical software version 21.0.

4. Results

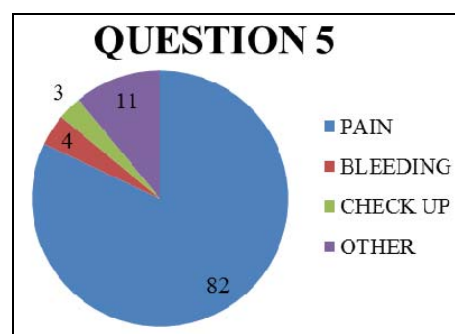
On evaluating the demographic data, a wide-range distribution of age groups from 24years till 80years participated in this study with the mean age being 49.8years of age and predominant subjects belonging to 41- 50yrs (33%) followed by 51-60yrs (30%) category (Graph 1). Both males (50%), Females (50%) were equally distributed in the study. Fasting and random blood sugar levels subjected to Wilcoxon signed-rank test calculator showed approximately normal distribution (w=94) with Z value of -8.3586 and p-value of <.0001 which is highly significant.



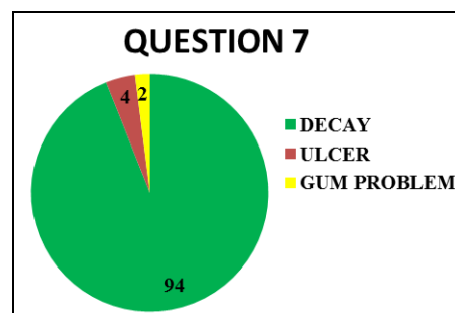
Graph 1: Age wise distribution of the study participants.

Chi-square goodness of fit was performed to determine the level of significance and association between the variables for the questionnaire. About 92% were Non-insulin dependent participants among which 62% feel there is a significant relation between diabetes and oral health problem and 64% noticed significant changes in their oral cavity after diabetes. Questionnaire analysis also showed significant study participants were presented with Oral health problems such as pain (82%) (Graph 2), tooth decay (94%) (Graph 3), gum diseases (6%), dry mouth (93%) often with (15%) or without

loss of sensation (85%) (Table1).



Graph 2: Graph showing the most common reason for visiting dentist



Graph 3: Graph showing various oral health problems observed among diabetic individuals

Table 1: Table showing the frequencies and significant level of each response.

Q No	A	B	C	D	Chi Square	P Value*	Significance
1	NA	NA	NA	NA	94.3586	<.00001	Significant
2	8	92			70.56	<.00001	Significant
3	62	38			5.76	0.0164	Significant
4	64	36			7.84	0.00511	Significant
5	82	4	3	11	174.8	<.00001	Significant
6	13	87			54.76	<.00001	Significant
7	94	4	2		160.478	<.00001	Significant
8	93	7			73.96	<.00001	Significant
9	15	85			49	<.00001	Significant
10	42	35	23		5.034	0.08071	Not significant

*Significant at p<.001

5. Discussion

Based on available literature it is evident that oral health is affected in individuals who suffer from Diabetes. Numerous studies that have investigated the connection between dental caries, dry mouth, periodontal diseases and diabetes mellitus though failed to establish a specific relationship between the disease progress and oral health, most authors agree that there is a higher prevalence and severity of gingival disease, with diabetes, and that it has an early onset [11].

In the present study it was observed oral health problems such as pain (82%), tooth decay (94%), gum diseases (6%), dry mouth (93%) often with (15%) or without loss of sensation (85%). This is similar to study on 350 diabetic individuals by Nikbin *et al.* [12] and Vernillo *et al.* [13] who showed that some oral conditions such as xerostomia, clinical attachment loss, number of missing teeth and plaque index were correlated to diabetes control level (HbA1c) and type of anti-diabetic medication. Studies by Nikibin *et al.* [12], Vernillo *et al.* [13], Lux *et al.* [14], Ueta *et al.* [15], Rawal *et al.* [16] reported some oral problems, such as tooth decay, halitosis, oral burning sensation and accumulation of plaque can lead to gingival

inflammation, in patients with poor oral hygiene. This is similar to the present study which demonstrated 93% participants with dry mouth and 94% presented with tooth decay. This can be due to disturbances in function of white blood cells and vascular changes in gingiva causing decrease flow of nutrients to the oral tissues and removal of noxious agents from oral tissues which in turn can decrease the ability of host defense mechanisms to resist inflammation in diabetic patients [15].

The present study showed tooth decay (94%) to be predominant oral health problem. This is comparable to study by Geetha *et al.* [17], Malvania *et al.* [18] who observed dental caries prevalence among type II diabetic individuals. Similarly, studies by Ferizi *et al.* [19], Preethi *et al.* [20] and Al-Maskari *et al.* [21] showed relationship between diabetes and dental caries owing to its association with carbohydrates or sugar byproducts. The insulin insufficiency in diabetes may lead to decreased salivation and elevated salivary glucose levels, which may cause diabetic patients at a high risk of caries development and in contrast, study by Gupta *et al.* [22], Bassir *et al.* [23] reported low prevalence of dental caries among diabetics which would be related to certain factors such as poor oral hygiene, rare dental visits, and lack of metabolic control of diabetes.

About 92% were Non-insulin dependent participants among which 62% feel there is a significant relation between diabetes and oral health problem and 64% noticed significant changes in their oral cavity after diabetes. This is similar to study by Gupta *et al.* [22] who reported 60% noticed changes in oral cavity after being diagnosed as diabetic, and about 58% visited dentist for bleeding gums whereas in contrast only less than 10% reported for the same in the present study. The present study similarly reported no significant difference regarding their attitude toward oral health checkup or factors influencing their visit to a dentist.

The prevalence of severe hypogeusia or ageusia is lower presenting with only 15% of the study population. Estimations of the prevalence of any disturbance of taste in the adult population range from 0.93% in the US to 2.5% in Sweden [24]. These observations were similar to the present study where participants often present with sensation loss (15%) or without loss of sensation (85%). Besides diabetes many other risk factors have been proposed in literature, including older age, biological or functional changes, oral and systemic diseases, iatrogenic causes, nutritional deficiencies, and lifestyle activities.

Our results revealed that about 42% of diabetics visit their dentist on regular basis, and about 23% of them had not visited dental clinic within last year. Gupta *et al.* [22] showed only 10%–12% of participants visited dental clinic on regular basis. Most of the participants thought that there was no need while 13%–18% lacked time. On the contrary, surveys conducted in the UK showed that about 37%–47% of participants visited dentist on a regular basis [25].

6. Conclusion

The outcome of present study showed dental caries, dry mouth and gingival disease are largely influenced by diabetic state. More rigorous and systematic studies, such as prospective or interventional studies, using a large population, will be necessary to confirm and to establish a clear association between diabetes mellitus and oral health disease. It should be noted that majority of the study participants' feel there is a significant relation between diabetes with oral health problem and also observed significant changes in their

oral cavity after diabetes medications that can either directly or indirectly influence their quality of life.

7. Acknowledgement: Nil

8. Conflict of interest: None Declared

9. Ethical statement: Investigation was approved by institutional ethical committee board (IERB) and informed consent was obtained.

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