Research Article

Influence of Diet on Dental Caries in Diabetic Patients

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ABSTRACT

The aim of the study is to find the relationship, if any, between diet, diabetics and dental caries. Dental caries is the most common complaint in everyday dental practice. Dental caries causes significant pain amongst people. The presence of decayed tooth limits the individual's social interactions due to its unaesthetic appearance. The diet plays an important role in preventing dental caries. But the influence of diabetics on the disease is controversial. The study was conducted amongst 50 diabetic patients and 50 non-diabetic patients. A survey was conducted in which they were questioned about their dietary habits, oral hygiene habits, the incidence of dental caries was recorded by calculating their DMFS score, and if the patient was diabetic their medical status regarding the disease was also enquired. The results of the survey were tabulated. In the survey conducted 26% of the patients who had DMFS greater than 10 had uncontrolled diabetics. More than 50% of the diabetic patients with more than 10 DMFS had a diet rich in carbohydrates and low calcium. The study revealed that there exists a relationship between diabetics mellitus and dental caries. It also revealed that the role of diet in the occurrence of the disease is also significant. Further studies should be conducted to have a better understanding of the disease and to formulate a better treatment plan.

Keywords: Dental caries, diabetes mellitus, diet, DMFS.

INTRODUCTION

Dental caries is the demineralisation of susceptible dental hard tissues by acids produced by bacteria during the fermentation of carbohydrates consumed by us[1,2]. Dental caries affects people of various age groups[3]. Endogenous bacteria, primarily *Steptococcus mutans, Streptococcus sobrinus,* and *Lactobacilli* spp., in the dental plaque produce weak organic acids from as by-products of fermentable carbohydrates from our diets. This causes a drop in local pH in the mouth below a critical value, which results in demineralization of the tooth structures[4-6]. Dental caries occurs due to a variety of reasons. Physical and biologic risk factors for caries include inadequate salivary flow and composition, high numbers of caries-producing bacteria, insufficient fluoride exposure, gingival recession, immunological factors, the need for special health care, and genetic factors[1, 4,7-10]. Lifestyle and behavioural risk factors for dental caries include poor oral hygiene, poor dietary habits, frequent consumption of refined carbohydrates, frequent use of oral medications that contain sugar, and inappropriate methods of feeding infants[1,4,7,11].

Diabetes mellitus is a disease arising due to the defect in production or function or both of insulin hormone. Insulin produced by the bets cells in the liver regulates blood glucose levels and is essential for the processing of the bodies carbohydrates, proteins and fats[12]. Hence the symptoms of diabetes include those of abnormal carbohydrate, protein, and fat metabolism. There are two types of diabetes: type 1 diabetes and type 2 diabetes. Type 1 diabetes, formerly known as insulin-dependent diabetes mellitus, is caused by a deficiency of insulin. This type of diabetes is commonly seen in children and young adults[13].

Type 2 diabetes, formerly known as non-insulin-dependent diabetes mellitus accounts for 90 to 95 percent of all diagnosed cases of diabetes and is caused by insulin resistance and an insulin secretory defect. It is associated with older age, obesity, family history of diabetes, history of gestational diabetes, impaired glucose metabolism, physical inactivity, and race/ethnicity[14].

People with diabetes are more susceptible to oral diseases like gingivitis, periodontal diseases and alveolar bone loss due to their poor glycemic control[15,16]. Diabetic patients also have high risks of acquiring dental caries due this reason. Hyposalivation that may be seen in these patients also aids in the progression of dental caries[3,17].

Dental caries is the most common infectious disease and cause of tooth loss. The purpose of this study is to identify the role of nutrition and diabetics on dental caries.

MATERIALS AND METHODS

In this study a survey was conducted amongst 100 patients, 50 diabetic and 50 non-diabetic, visiting Saveetha Dental College and Hospitals. The minimal age for inclusion in the study was 17 years.

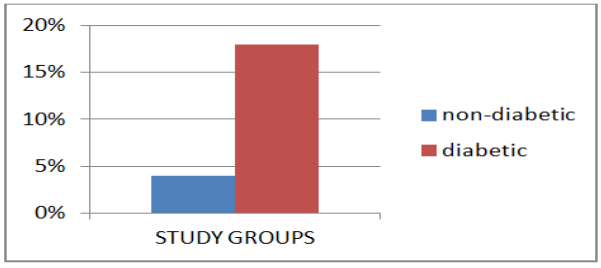
The patients were questioned about their dietary habits, oral hygiene habits, the incidence of dental caries was recorded by calculating their DMFS score, and if the patient was diabetic their medical status regarding the disease was also enquired.

The results of the survey were tabulated in an excel spread sheet and statistics was done.

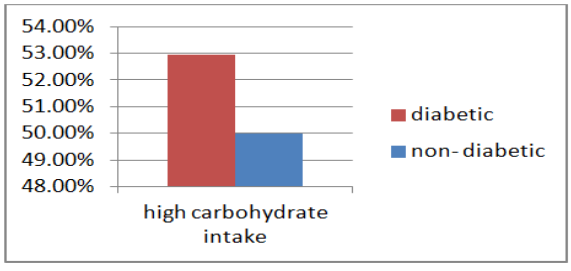
RESULTS

In the study conducted 50 diabetic and 50 non-diabetic patients were considered. Amongst the diabetic patients 60% (30) patients had controlled diabetics and 40% (20) patients had uncontrolled diabetics. Considering the DMFS score amongst the diabetic patients 10% (5) patients had DMFS score below 5, 56% (28) patients fell in between 5 and 10, 16% (8) patients fell in the slot between 10 and 15, and 18% (9) patients fell in the slot above 15. Amongst those patients that had DMFS score greater than 10, 4% (2) of the patients had their diabetics in control and 26% (13) of the patients had uncontrolled diabetics. 82.35% (14) of the patients who had DMFS score more than 10 were non-vegetarians, 52.94% (9) of the patients had a carbohydrate rich diet, 47.05% (8) of the patients had a diet deficient in calcium, and 52.94% (9) of the patients had a diet rich in sugary substances. Considering oral hygiene practices 60% (3) of the patients who had DMFS score less than 5 were found to brush twice a day.

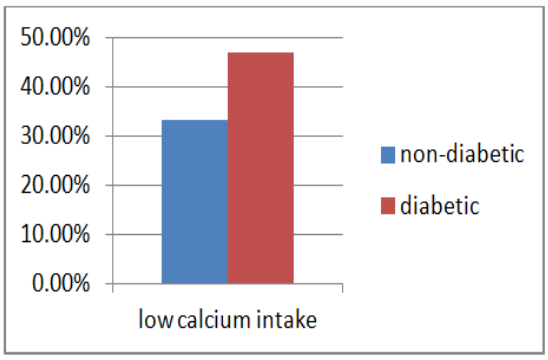
Amongst the non-diabetic patients 64% (32) of the patients had their DMFS score below 5, 26% (13) of the patients fell in the slot between 5 and 10, 8% (4) of the patients fell in the slot between 10 and 15, and 4% (2) of the patients had a score above 15. Looking into the dietary habits of those who had DMFS score greater than 10 it was found that 16.66% (1) of the patients were non-vegetarians, 50% (8) of the patients had a diet rich in carbohydrates, 33.33% (5) of the patients had a diet rich in sugary substances, and 33.33% (5) of the patients had a diet low in calcium. Considering oral hygiene, 62.50% (20) of the patients who had their DMFS score below 5 brushed twice every day.



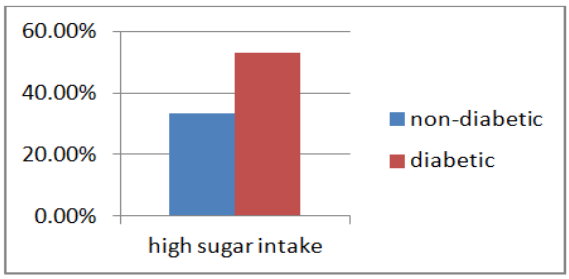
Graph 1: Comparison of caries occurrence amongst the study groups



Graph 2: High carbohydrate intake and caries occurrence



Graph 3: Low calcium intake and caries occurrence



Graph 4: High sugar intake and caries occurrence

DISCUSSION

Dental caries is one of the most common clinical complaints in routine dental practice. Periodic studies are required in this area to have an updated knowledge of the prevalence, factors affecting their incidence and other related clinical problems. The effect of dental caries and its sequelae can cause significant pain among patients. Oral-facial pain can greatly reduce the quality of life and restrict many daily functions of individuals. This study was done in a hospital as the population is usually diverse and is representative of the population in that area.

In the present study it was found that people with diabetics were more susceptible to dental caries as 18% of them had DMFS greater than 15 whereas amongst the non-diabetic patients only 4% of them had DMFS more than 15. From this observation we understand that those with diabetics are more prone to dental caries (graph 1). This may be due to the increased blood glucose levels and decreased salivary flow. This result was similar to the results obtained by I. Ciglar[18]. The study also shows that amongst the diabetic patients that have a DMFS less than 5, 60% of them brush their teeth twice a day. Even amongst the non-diabetic patients similar results were obtained. This suggests that oral hygiene practices play a very important role in the prevention of this infectious disease.

Considering the patients dietary habits, our survey revealed that amongst diabetic patients that were non-vegetarians 82.35% of them had DMFS score above 10 suggesting severe dental caries. Where as in non-diabetic patients the relation is not so significant (16.66%). The study also shows a significant relationship between those

diabetics that have a high carbohydrate diet and increased incidence of dental caries (52.94%) and the same in non-diabetic patients (50%) (Graph 2). This result is in accordance to the existing literature[18,19]. The higher percentage amongst the diabetic patients may be due to the already increased amounts of glucose present in the body and the high carbohydrate diet adds to the increased amounts. Our study showed that calcium is an important nutrient in the etiology of dental caries. It showed that amongst diabetic patients 47.05% of them who had DMFS score more than 10 had a diet very low in calcium. Amongst non-diabetics 33.33% of them had low calcium intake (graph 3). Calcium is an important constituent of the tooth enamel. Deficiency of calcium may make the tooth surface more prone to dental caries. The increase of percentage amongst the diabetics is attributed to the decreased salivary flow. In normal patients saliva not only acts as a buffer but also has components that directly attack cariogenic bacteria and prevent dental caries[3,17]. Decrease in saliva production hence leads to decreased resistance to cariogenic bacteria. Our survey also studied the relation of sucrose content in diet and the incidence of dental caries. Amongst the diabetic patients 52.94% of the patients that had DMFS score more than 10 were found to have a diet rich in sugary substances. Similarly amongst the non-diabetic patients 33.33% of them had increased sugar intake (graph 4). This result is in accordance to the existing literature[20]. The bacteria present in the plaque react with sugar (mainly sucrose) present in the diet to produce acid which dissolves the enamel.

CONCLUSION

The present study has revealed a positive relationship between diabetes mellitus dental caries and dietary habits. More studies have to be conducted on a larger scale to get more significant results and obtain a better knowledge in this area. This would help us in providing better prevention methods, early detection of the disease and more efficient treatment options.

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