Salivary flow and sweet tasting threshold in diabetes mellitus: Controlled versus uncontrolled patients

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معدل إفراز اللعاب وحاسة التذوق للسكريات في مرضى السكر: دراسة مقارنة بين المرضى تحت العلاج والمرضى بدون علاج

رساله للحصول على درجة الماجستير بقسم
طب الفم وأمراض اللثة

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Abstract

Diabetes mellitus is considered a common metabolic disorder of heterogeneous etiologies. It is a multifactorial disorder.

Diabetes mellitus has many related general complications as diabetic neuropathy, retinopathy and nephropathy. Its oral complications include periodontitis, abscesses, increase liability to infection, decrease in salivary flow and affection of taste sensation.

Control of diabetes would influence salivary flow rate both resting and stimulating. Saliva protects the integrity of the soft an hard tissue inside the oral cavity, and affects taste perception especially sweet taste perception.

Key Words: Diabetes Mellitus- Salivary flow- Taste perception- Hyperglycemia – Diabetic neuropathy – Gustatory taste score- Taste buds.

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DM	Diabetes mellitus
NIDDM	Non insulin dependent diabetes mellitus
IDDM	Insulin dependent diabetes mellitus
GDM	Gestational diabetes mellitus
WHO	World health organization
FDR	First degree relative
ADA	American diabetes association
HLA	Human leucocyte antigen
AGEs	Advanced glycatoin end products
DKA	Diabetic ketoacidosis
USFR	Unstimulated salivary flow rate
HbA1C	Glycosylated haemoglobin
RSF	Resting salivary flow
SSF	Stimulated salivary flow

Aim of the study

The present study was carried out to compare the salivary flow rate and sweet taste sensation in type I and type II DM, both controlled and uncontrolled patients.

Discussion

DM comprises a syndrome of common metabolic disorders that share the phenotype of inappropriate hyperglycemia. It is associated with irregularities in the metabolism of carbohydrates, lipids, and proteins, and susceptibility to the development of specific forms of premature renal, ocular, neurological, and cardiovascular diseases ***(De Lima et al., 2008;Sun et al., 2008)***.

DM is one of the most prevalent diseases worldwide and is commonly found in dental patients. Patients with a diagnosis of DM present a higher susceptibility to infections due to deficiency in PMNs, as a result of vascular alterations and neuropathies ***(Varon & Mackshipman, 2000; De Lima et al., 2008)***.

Diabetic patients, especially those with poor control of glycemia, suffer from disorders such as xerostomia, impairment of taste, periodontal diseases and oral candidosis ***(Sandberg et al., 2000; Lamers et al., 2007)***. In addition, other oral manifestations have been reported, such as ketonic breath (sweet breath), higher residual bone resorption, loss of oral mucosal resilience which is necessary for good adaptation of a complete denture and tissue regeneration times above normal ***(Soysa et al.,2006; Owen& McCarthy, 2007).***

Saliva exerts a fundamental role in the maintenance of oral health ***(Amerongen & Veerman, 2002).*** Saliva aids in digestion, mastication, oral microbial defense, lubrication, speech, deglutition and preservation of mineralized and mucosal tissues. Also, saliva is the principle fluid component of the external environment of the taste receptor cells and as

such, could play a role in taste sensitivity. Its main role includes transport of taste substances and protection of taste receptor. These functions are essential for the maintenance of oral and pharyngeal health and a comfortable quality of life ***(Mata et al., 2004)***.

Xerostomia is a common complaint among diabetic patients, which is closely connected to polydipsia. Xerostomia is associated with damage to salivary gland activity, resulting in marked decrease in their ability to synthesize, transport and secret saliva ***(Moore et al., 2001; Fedirko et al., 2005)***.

Disorders of taste have been difficult to diagnose and treat, often because lack of knowledge and understanding of this sense. Alteration in taste may be a secondary process in various disease states, or it may be the primary complaint ***(Noell and Marby, 2002)***.

Taste dysfunction may have a significant impact on the quality of life, as deficiency in taste can cause anxiety, depression, and even nutritional deficiencies due to decreased enjoyment of food. Patients frequently report increased use of sugar and salt to compensate for diminished senses of smell and taste, a practice that is detrimental to those with DM or hypertension ***(Bromley, 2000; Noell and Marby, 2002).***

Consequently, the present investigation was carried out to compare the salivary flow rate and sweet taste sensation in type I and type II DM, both controlled and uncontrolled patients.

The study was carried out on a total of 250 subjects. 200 individuals suffering from DM compared to 50 healthy subjects. 100 patients suffering from type I DM, 50 patients were controlled type I and

50 patients were uncontrolled type I. 100 patients suffering from type II DM, 50 patients were controlled type II and 50 patients were uncontrolled type II.

Age and gender matching was carried out on choosing the control population in order to avoid any effect on the results. Also, smokers were excluded as smoking is known to affect taste perception. Drug administration was also avoided because some drugs affect both salivary flow and normal gestation ***(Fauci et al. ,1998; Porter et al., 2004).*** Only male subjects were selected in this study due to the fact that hormonal changes occurring in female were found to produce changes in salivary flow rates ***(Dodds et al., 2005).***

Both DM patients and control subjects were referred to ENT specialist to exclude gustatory olfactory confusion where olfactory dysfunction is perceived by the patients as loss of taste sensation ***(Mott & Leopold, 1991).***

HbA1C values are directly proportional to the concentration of glucose in the blood over the full life time of the red blood cells and therefore reflect mean glycemia over the previous 90 to 120 days. So, HbA1C is the gold standard for assessing and monitoring glycemic control in patients with DM ***(Dailey, 2006)***.

There was a decreased in the salivary flow rates among subjects with elevated HbA1C values ***(Chavez et al. 2001; Moore et al., 2001).***

In order to achieve more accurate diagnosis in our study, HbA1C was measured. The present results agreed with the observation of ***Wahba & Chang, (2007)*** who stated that the criterion of <7.1% total glycosylated HbA1C, was considered fair to good glycemic control, and