

Xerostomia appearance in type 1 diabetes mellitus children in RSUPN dr. Cipto Mangunkusumo Jakarta

Adis Tyaning Puspitasari*), Rosiliwati Wihardja*, Jakobus Runkat**

*Department of Oral Biology Faculty of Dentistry Universitas Padjadjaran

**Department of Pedodontics Faculty of Dentistry Universitas Padjadjaran

ABSTRACT

Diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia due to insulin deficiency. As a result, there will be metabolic disturbances on carbohydrate, fat, and protein. Diabetes mellitus type 1 may occur because of pancreatic β cells damage resulting in decreased secretion of insulin in absolute terms. Xerostomia is the medical term for the subjective complaint of dry mouth due to the lack of saliva and can occur in patients with type 1 diabetes mellitus. The purpose of this study was to obtain data on the salivary flow rate and oral dryness complaints in children with type 1 diabetes mellitus. The method of this study was descriptive by survey technique. The sample was obtained by purposive sampling and consisted of 30 children with type 1 diabetes mellitus in RSUPN Dr. Cipto Mangunkusumo Jakarta in April to May 2010. The study was conducted with an objective examination by measuring the salivary flow rate and subjective examination using a questionnaire. The results showed that the salivary flow rate from an average of 30 respondents were below normal values. The most common complaints about the dryness of the mouth cavity were thirst, 24 patients (80.00%), and oral dryness 19 patients (63.33%). The conclusion from this study showed that children with type 1 diabetes mellitus were having oral dryness complaints and the decrease of salivary flow rate.

Key words: Type 1 diabetes mellitus, xerostomia

ABSTRAK

Diabetes melitus adalah suatu penyakit metabolik kronis yang ditandai oleh hiperglikemi akibat kekurangan insulin sehingga terjadi gangguan metabolisme karbohidrat, lemak, dan protein. Diabetes melitus tipe 1 disebabkan oleh kerusakan sel β pankreas sehingga terjadi penurunan sekresi insulin secara absolut. Xerostomia adalah keluhan mulut kering yang disebabkan oleh berkurangnya laju sekresi saliva dan dapat muncul pada pasien diabetes melitus tipe 1. Tujuan penelitian ini adalah untuk memperoleh data laju sekresi saliva dan keluhan kekeringan rongga mulut anak diabetes melitus tipe 1. Metode yang digunakan adalah deskriptif dengan teknik survei. Sampel penelitian diperoleh dengan teknik purposive sampling dan terdiri dari 30 anak diabetes melitus tipe 1 di RSUPN Dr. Cipto Mangunkusumo Jakarta pada bulan April-Mei 2010. Penelitian dilakukan dengan pemeriksaan objektif berupa pengukuran laju sekresi saliva dan pemeriksaan subjektif berupa kuesioner. Hasil penelitian menunjukkan bahwa laju sekresi rata-rata saliva dari 30 responden di bawah nilai normal (0,75-1 ml/menit), yaitu sebesar 0,33 ml/menit. Keluhan kekeringan rongga mulut yang paling banyak ditemui adalah sering haus dan mulut

*Correspondence author: Adis Tyaning Puspitasari, Department of Oral Biology Faculty of Dentistry Universitas Padjadjaran Jl. Sekeloa Selatan No. 1 Bandung, West Java-Indonesia, Tel./Fax: +6222-2504985/2532805

terasa kering masing-masing sebanyak 24 pasien (80,00%) dan 19 pasien (63,33%). Simpulan penelitian ini menunjukkan anak diabetes melitus tipe 1 mengalami keluhan kekeringan rongga mulut dan penurunan laju sekresi saliva.

Kata kunci: *Diabetes melitus tipe 1, xerostomia*

INTRODUCTION

Type 1 diabetes mellitus or generally called as Insulin Dependent Diabetes Mellitus is one of diabetes types that was caused by the damaged pancreatic β cells and subsequently impair the insulin secretion.¹ This type of diabetes commonly found in children and teens but could also be found in adults aged late 30 or early 40.² More than 95% cases of diabetes occurred in children were type 1 diabetes mellitus.³ This type of diabetes occurred in 5-10% of all diabetes.⁴ The type 1 of diabetes mellitus patients had the more severe condition than the other types of diabetes because of the blood glucose concentration fluctuation which could cause more severe complications.⁵

Oral complications can occurred in type 1 diabetes mellitus, such as the increased periodontal disease, saliva flow and composition changes, burn taste mouth, and also increased candidiasis.⁶ A study done in Pittsburgh University toward 406 patients of type 1 diabetes mellitus showed that there was decreased saliva flow that was a sign of *xerostomia*, as the patient felt dry mouth symptoms.⁷

Xerostomia is an oral dryness that possibly caused by the decreased of saliva flow and composition.⁸ Saliva is needed to maintain the oral cavity health.⁷ The normal saliva amount and composition helped the oral cavity to maintain its health, clean the toxic substances, pH buffer, enzyme neutralization and bacterial toxin, microorganism control, maintain the integrity of oral soft tissue and the teeth. While the oral cavity normal condition impaired as a result of decreased saliva flow or composition, it is prone to damages and can be worse.^{1,9}

Oral dryness complaint (*xerostomia*) and decreased saliva function in diabetes mellitus patient could be caused by the polyuria. Besides of that, this condition could also be based on the metabolism problem or endocrine.¹⁰ Another factor that could can cause *xerostomia* is the autonomic neuropathy in diabetes mellitus

patient. This autonomic neuropathy impaired the sympathetic and parasympathetic nerve pathway that controlled the saliva secretion flow so that there would be decreased saliva flow.¹¹ Xerostomia in diabetes mellitus patients mostly caused by the drugs more than the diabetes itself. Drugs regimes given to diabetes mellitus patients, either related or not with the systemic condition, can cause *xerostomia* effect.¹²

This study objectives were to obtain data regarding the saliva volume and flow and also the oral dryness complaint in type 1 diabetes mellitus children patients.—

METHODS

This was a descriptive study with survey technique which was done toward the type 1 diabetes mellitus children patient in RSUPN Dr. Cipto Mangunkusumo Jakarta. Sample obtained using the purposive sampling method with criteria as follows: 1) type 1 diabetes mellitus patients which came into the Endocrinology Department RSUPN Dr. Cipto Mangunkusumo Jakarta; 2) aged 6-18 years old; 3) agreed to be a subject of this study.

The procedure started with detailed explanation about the study to the subjects and their families. After the patient agreed and willing to be studied, patient or their family were asked to sign the informed consent with their identity on it. Patient sat on the examination chair. Then the researcher examine the patient with these protocols: (1) the researcher gave a questionnaire related with *xerostomia* to the patient or their family; (2) collected saliva using the spitting without stimulation. Patient was asked to retain saliva in their mouth for 5 minutes. Then every spit done in 1 minute and collected in a measured glass¹²; (3) the saliva volume measured and the secretion rate was calculated; (4) patient was asked to open their mouth, then the researcher examine the clinical oral condition of the patient.

Table 1. Saliva secretion flow distribution in type 1 diabetes mellitus children

Secretion flow (ml)	Total (n)	%
0.05-0.09	4	13.33
0.1-0.19	5	16.67
0.2-0.29	4	13.33
0.3-0.39	5	16.67
0.4-0.49	3	10.00
0.5-0.59	8	26.67
0.6-0.69	0	0
0.7-0.79	0	0
0.8-0.89	1	3.33
Total	30	100.00
Average secretion flow	0.33	

Table 2. Mean of saliva secretion flow distribution based on the age of the children with type 1 diabetes mellitus

Age (Year)	Total (n)	Average Secretion flow (ml/minute)
6-9	4	0.17
10-13	11	0.44
14-17	15	0.30
Total	30	

Table 3. Distribution of oral dryness complaints in type 1 diabetes mellitus children

Complaint	Total	%
Oral dryness	19	63.33
Thirsty	24	80.00
Burn/pain sensation in oral cavity	7	23.33
Lips or cheek often stuck onto the teeth	5	16.67
Difficulties in mastication	7	23.33
Foul taste of the tongue	12	40.00
Hard swallowing	10	33.33
Difficulties in speaking	6	20.00

RESULT

The study which done toward 30 type 1 diabetes mellitus children in Endocrinology Department of RSUPN Dr. Cipto Mangunkusumo Jakarta in period of April-May 2010 by collection of their saliva using non-stimulated spitting method, obtained that the mean of saliva secretion rate was 0.33 ml/minute. The most saliva secretion flow was 0.5-0.9 ml/minute for 8 respondents (26.67%). The lowest saliva secretion rate was 0.05-0.09 ml/minute for

4 respondent (13.33%). The biggest mean of secretion flow was in the range of age 10-13 years old, as much as 0.44 ml/minute (Tab. 1).

Based on this study, the most reported chief complaints were thirsty (80.00%), then followed by oral dryness (63.33%), tongue bad taste (40.00%), hard swallowing (33.33%), difficulties in masticating food (23.33%), burn or pain sensation in the oral cavity (23.33%), difficulties in speaking (20.00%), and inside of the lips stuck onto teeth (16.67%) (Tab. 3).

DISCUSSION

The mean of saliva secretion flow in 30 patients of Type 1 diabetes mellitus children in RSUPN Dr. Cipto Mangunkusumo Jakarta in period of April-May 2010 was 0.33 ml/minute. This showed that the type 1 diabetes mellitus children saliva secretion flow was lower than the normal value.

Patients with type 1 diabetes mellitus showed a decreased saliva secretion flow therefore appeared the chief complain of oral dryness. There was no relationship between diabetes mellitus and saliva glands dysfunction. Xerostomia and hypo function of saliva glands were frequently reported that it had related with diabetes mellitus with poor metabolic control. Neuropathy in type 1 diabetes mellitus which related with the saliva secretion control could decrease the saliva secretion. The dehydrated state of type 1 diabetes mellitus patients could also cause temporary structural changes in saliva glands. The drug regimes that caused xerostomia and increased fasting blood glucose level were also closely related with the decreased saliva secretion.^{7,13-15}

Based on the study regarding the complications occurred in diabetes mellitus patients, only neuropathy related to xerostomia. Diabetes mellitus patients with neuropathy often suffered from decreased saliva secretion and oral dryness.⁷ Diabetic neuropathy is a degenerative complication of diabetes mellitus and was caused by a very high blood glucose level so that the nerves or vessels sheath which carried oxygen for the nerves were broken. This complication could also resulted structural changes in saliva glands tissues. Neuropathy occurred in the autonomic system would impaired the sympathetic pathways and parasym-

pathetic pathways which control the saliva secretion flow so therefore the decreased saliva secretion occurred.^{11-13,16}

Dehydration as a result of chronic hyperglycemia as a consequence of polyuria was the main cause of xerostomia in diabetes mellitus patients. The decreased insulin number raised the blood glucose level as those glucose could not enter the tissue. This caused the kidney could not reabsorb the excess glucose therefore glucosuria occurred. This condition eventually caused the osmotic diuresis so that the polyuria occurred.^{10,13,17} The excessive urine excretion resulted in impaired water and electrolyte control. This followed by disrupted negative water balance that could cause a decreased saliva secretion.¹⁸

Based on this study, the mean of secretion most shown in 10-13 range of ages, which is 0.44 ml/minute. Age could varied the saliva secretion level. Based on the literature, the saliva secretion level would be increased as children growth to teenage.¹⁹

In this study, it was founded several complains of the type 1 diabetes mellitus children oral cavity. The most reported complain was the thirsty condition, for as much as 80.00%. The thirst condition was in accordance with the literature stated that there was increased thirst level in xerostomia patients.²⁰ The saliva secretion is important in maintaining the body fluid balance. Secretion will be reduced while dehydration therefore causes the thirst condition.²¹ The increased need to drink in diabetes mellitus patients was caused by the polyuria. The high blood glucose level had made the kidney could not resorb the excess glucose so there was glucosuria. This condition caused the osmotic diuresis therefore the urine excretion would be increased while oral intake needs of fluid/water would also be increased.¹⁷

As much as 63.33% of the respondents complained about the oral dryness. Based on the literature, xerostomia is a subjective expression in form of oral dryness complain.²² Most of the patients complained about the dryness on all over their mucosal surfaces including the throat.²³

Respondents which complained regarding their foul taste of the tongue were as much as 40.00%. The literature said that saliva played a role as solvent in taste perception. Taste of an

agent would be recognized if it was dissolved. The tongue taste buds would lost its function in dry condition. The xerostomia patients would complained about the reduced or changed of taste perception.^{18,23,24}

The difficulties in swallowing and chewing food each founded at 33.33% and 23.33% respectively. Based on the literature, the xerostomia patients will be suffered from difficulties in swallowing and chewing food. The normal mastication will result in a slimy and slippery food bolus so it would be easy to be swallowed. Most of the patients needed water to help them swallow the food, or could not swallowed dry food.^{18,23}

Respondents complained about burn or pain sensation in their oral cavity were as much as 23.33%. This pain sensation was commonly found in xerostomia patients.²³ As much as 20.00% respondents complained about difficulties in speaking. The literature said that adequate saliva flow would ease the tongue and lips movement in creating clear articulation.²³ The stucked inside of lips or cheek on the teeth were founded in 16.67% respondents. This complain was in accordance with the literature stated that the oral mucosa of xerostomia patients could stucked on teeth enamel.¹²

CONCLUSION

Based on the objective study, most of the type 1 diabetes mellitus children showed clinical symptoms of xerostomia in form of decreased saliva volume and flow which were lower than the reference level. Based on the subjective study, the most complained symptom in children with diabetes mellitus which accompanied with xerostomia was thirst, followed by oral dryness, foul taste of the tongue, difficult to swallow, burn/pain sensation of oral mucosa, difficult to chew/masticate, speech difficulties, and the stucked inside of lips or cheek mucosa on the teeth.

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