ORIGINAL ARTICLE

The effect of xerostomia on the quality of life of controlled and uncontrolled type 2 diabetes mellitus patients

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ABSTRACT

Introduction: Type 2 diabetes mellitus can cause oral manifestations, such as xerostomia. Xerostomia can cause problems, such as difficulty eating, chewing and swallowing, so that it can effect the quality of life. The aim of this research is to analyze the effect of xerostomia on the quality of life of controlled and uncontrolled type 2 diabetes mellitus patients. **Methods:** This research was an analytical observational cross-sectional study involving 92 subjects from type 2 diabetes mellitus patients aged 21 until 50 years (46 subjects of controlled and 46 subjects of uncontrolled type 2 diabetes mellitus patients). Xerostomia data was collected by Summated Xerostomia Inventory-Dutch Version questionnaire, while the quality of life data was collected by Xerostomia-related Quality of Life Scale (XeQoLs) questionnaire. All research data were analyzed descriptively and bivariate analysis with Chi-Square test. **Results:** The results showed that the quality of life of controlled and uncontrolled type 2 diabetes mellitus patients was equally low (50% in controlled type 2 DM patients and 64.9% in uncontrolled type 2 DM patients). This result showed that there is no difference between each subjects groups. This also can be seen from the results of statistical tests that $p = 0.193$ ($p > 0.05$), which means that there is no significant difference between the quality of life of controlled and uncontrolled type 2 diabetes mellitus patients. **Conclusion:** There was no effect between xerostomia of controlled and uncontrolled type 2 DM patients with their quality of life.

KEYWORDS
type 2 diabetes mellitus, xerostomia-related to quality of life, xerostomia

INTRODUCTION

Type 2 diabetes mellitus (DM) is a common type of diabetes mellitus suffered by DM patients.[1] Type 2 DM patients with high glucose levels have a risk of complications and oral manifestations. Complications of diabetes mellitus that manifest in the oral cavity such as xerostomia, periodontal disease, burning mouth syndrome, wound care, caries, and oral candidiasis.[2,3]

Xerostomia is one of the oral manifestations of DM that patients often complain about. Xerostomia is a person's perception of dry mouth caused by a decrease salivary flow rate.[4,5] Xerostomia in type 2 DM patients caused by several factors, such as plasma glucose levels, age, duration of DM, polyuria, and the use of antidiabetic drugs.[4,6,7]

Based on plasma glucose level and HbA1C, type 2 DM patients can be categorized into 2 groups, controlled and uncontrolled. Uncontrolled type 2 diabetes patients have high risk xerostomia caused by prolonged hyperglycemia.[2,8] In controlled type 2 diabetes patients, the factors that influence the onset of xerostomia come from the presence of systemic dehydration, and the use of antidiabetic drugs.[4]

Xerostomia that occurs in controlled and uncontrolled type 2 DM patients can cause several problems such as difficulty in eating and chewing, and affecting the quality of life. Niklander et al and Molania et al stated that xerostomia affects oral health-related quality of life.[9,10] Another study stated that the OHRQoL in uncontrolled type 2 DM patients is worse than in controlled type 2 diabetes patients.[11,12] Differences in quality of life of people with controlled and uncontrolled type 2 diabetes mellitus can be caused by several things, such as the presence of xerostomia, microangiopathy that causes a decrease in taste function, and the high risk of caries that has affected masticatory function.[11]

The difference between this research and previous research regarding the effect of xerostomia on the quality of life of type 2 DM patients are in the research subjects, research locations, and the questionnaire used. In this research, the subjects were divided into 2, type 2 DM controlled and uncontrolled patient, and later the effect of xerostomia on quality of life related to xerostomia of the two subjects would be seen, in previous research only looked at the effect of xerostomia on the overall quality of life of type 2 diabetes mellitus patients without separating subjects. Another difference is also found in the method of assessing the quality of life of the subjects, this research used the Xerostomia Related Quality of Life Scale (XeQoLs) questionnaire, while previous research used the Oral Health Impact Profile - 14 (OHIP-14) questionnaire.[9,10,11] Based on the introduction,

the aim of this research is to analyze the effect of xerostomia on the quality of life of controlled and uncontrolled type 2 DM patients.

METHODS

This research was an observational analytic study with a cross sectional design study. Research subjects in this research were divided into 2, controlled and uncontrolled type 2 DM patients. The number of subjects were 92 subjects (46 subjects of controlled and 46 subjects of uncontrolled type 2 DM patients). This research used a purposive sampling technique based on inclusion criteria and exclusion criteria.

The inclusion criteria for this research were type 2 DM patients with HbA1C ≤ 7% for the controlled type 2 DM group and HbA1C > 7% for the uncontrolled type 2 DM group, type 2 DM patients aged 21 to 50 years and had suffered type 2 DM > 1 year. The exclusion criteria for this research were patients who underwent radiation therapy to the head and neck region, patients who consumed xerogenic drugs such as anticholinergics, diuretics, antidepressants, and antihistamines except anti-diabetic drugs and antihypertensive drugs, suffered from systemic diseases that caused salivary secretion disorders (such as Sjogren's syndrome, autoimmune disease, and hypothyroidism, Parkinson's disease) and patients who have moderate and severe stress, anxiety and depression based on DASS-21 (Depression, Anxiety and Stress Scale-21) questionnaire.

Subject who have received an explanation of this research and signed an informed consent, were asked to fill out a xerostomia questionnaire by Van der Putten (Summated Xerostomia Inventory-Dutch Version)[13] and Xerostomia-related Quality of Life Scale (XeQoLs) by Henson[14] which have been tested for validity and reliability. All data collected is processed by data processing (editing, coding, entry and cleaning) The data was analyzed by a frequency distribution table and the data was statistically analyzed by the Chi-Square test, where if the p value <0.05, it was stated that there was an effect between the two variables

RESULTS

This research was held at Puskesmas Pageruyung, Kendal from January to February 2022. The characteristics of the subject are shown in table 1. The characteristics of the subject in this research with the most gender being women with a total of 75 subjects (81.5%). Characteristics of subjects based on age showed that subject with an age range of 41-50 years were the largest category with 78 subjects (84.8%).

Table 1. Characteristics of subjects

Characteristics of Subjects	n (%)
Gender	
Men	17(18.5)
Women	75(81.5%)
Age (years old)	
21-30	1(1.1)
31-40	13(14.1)
41-50	78(84.8)

In this research, all subjects were tested for HbA1c. The average of HbA1c result in the controlled type 2 DM patients group was 6.2%, while in the uncontrolled type 2 DM patients group the average of HbA1C result was 10.3%.

Table 2 shows the number of research subjects who have xerostomia and not xerostomia. This research shows that there were 75 subjects with type 2 DM have xerostomia. Based on the results, the number of controlled type 2 DM patients who have xerostomia were 38 subjects, while subjects with uncontrolled type 2 DM who have xerostomia were 37 subjects.

Table 2. Xerostomia condition based on questionnaire in groups controlled and uncontrolled type 2 DM

Group	Xerostomia	
	Yes(%)	No(%)
Controlled type 2 DM	38(82.6)	8(17.4)
Uncontrolled type 2 DM	37(80.4)	9(19.6)

*xerostomia questionnaire (Summated Xerostomia Inventory-Dutch Version)[13]

Table 3. Quality of life of subjects with xerostomia in controlled and uncontrolled type 2 DM patients**

Group	Subjects with xerostomia	High quality of life		Low quality of life	
		n	%	n	%
Controlled Type 2 DM	38	19	50.0	19	50.0
Uncontrolled Type 2 DM	37	13	35.1	24	64.9

**Write by Henson Xerostomia-related Quality of Life Scale (XeQoLs)[14]

Table 4. Chi-Square test analysis

Sample group with xerostomia	Quality of life		Total	*p value*
	High	Low		
Controlled type 2 DM	19	19	38	0,193
Uncontrolled type 2 DM	13	24	37	

DISCUSSION

Type 2 DM is a metabolic disease that occurs because the pancreatic beta cells do not function properly.[15] Type 2 DM can cause complications and oral manifestations. Oral manifestations in diabetic patients such as xerostomia, caries, and oral candidiasis.[2] Xerostomia is the most complaints oral manifestation. Xerostomia is the perception of dry mouth, caused by a decrease in salivary flow rate.[4] The results in the table 1 showed that the most of subjects with type 2 DM were women. It is the same as the opinion of Naba et al, which stated that women mostly suffer from type 2 DM.[16] Women have a high level of susceptible to DM because the production of the hormones progesterone and estrogen causes the body's cells to respond to insulin.[17] In this research, patients with type 2 DM are dominated by the age of 41 to 50.

This result is supported by the statement of Hutabarat et al, that DM is mostly suffered by the early elderly (46-55 years). Type 2 DM, which occurs in the early elderly, is caused by a decrease in the body's general function and can impact on the occurrence of a person's pancreatic disorders.[17] Based on the results in table 2, patients with type 2 DM with xerostomia were 75 out of 92 subjects. Xerostomia that occurred in the group of controlled and uncontrolled type 2 DM patients is not much different, with as many as 38 subjects and 37 subjects. This research is appropriate with the study of Al-Maweri et al,which showed there was no significant difference in xerostomia experienced by patients with controlled DM (HbA1C < 9) and uncontrolled DM (HbA1C > 9).[18]

The causes there is no difference in the number of xerostomia in the two groups of respondents was controlled type 2 DM patients who consumed xerogenic drugs, such as anti-diabetic drugs, beta-blocker drugs (anti-hypertensive drugs), anticholinergics, and antihistamines. These drugs inhibit the action of muscarinic-3 (M3) receptors and can cause reduced salivary secretion and the occurrence of xerostomia.[19,20] Xerostomia in controlled type 2 DM patients can also occur due to the slow decrease in anti-diabetic drug levels in the salivary glands resulting in the accumulation of the drug on the salivary gland .[21,22,23]

Uncontrolled type 2 DM patients experience xerostomia due to prolonged hyperglycemia. Sari et al stated that the cause of xerostomia in uncontrolled type 2 DM patients is a complication of neuropathy diabetic and hyperglycemia. This previous research is appropriate with this research, it can seen from from uncontrolled type 2 DM patients who have hyperglycemia will experience diabetic neuropathy, and the subjects will have xerostomia. Neuropathy diabetic occurs when high glucose levels are converted into sorbitol by the body, it can damage sympathetic and parasympathetic nerve cells and cause salivary secretion disorders.[24] The impact of hyperglycemia is the patient frequently urinates (polyuria) so that fluid in the body is reduced and causes systemic dehydration and dryness in the mouth (xerostomia). [8,24]

Xerostomia experienced by controlled and uncontrolled type 2 DM patients, if not treated, will interfere with daily activities and have an impact on their quality of life.[10] It is not much different in the xerostomia-related quality of life in controlled and uncontrolled type 2 DM patients. There were 19 subjects with controlled type 2 DM with low quality of life, while there were 24 subjects with uncontrolled type 2 DM. The results of the statistical test showed p = 0.193, which means that there is no significant difference between the quality of life of patients with type 2 diabetes who are controlled and uncontrolled, so that there is no effect of xerostomia in both groups on their quality of life.

This study is appropriate with the research of Sadeghi et al which showed that the glycemic status of type 2 DM did not affect the OHRQoL.[25] Allen et al also stated that the status of diabetes mellitus had no impact on the OHRQoL.[26] The difference in quality of life in patients with type 2 diabetes with plasma glucose levels and controlled and uncontrolled HbA1C levels was because both groups of respondents experienced the same severity of xerostomia. The severity of xerostomia in patients with controlled and uncontrolled type 2 DM can occur if treatment is not carried out, so that it can cause other oral manifestations such as oral candidiasis, caries and angular cheilitis. Poor awareness about the importance of maintaining oral health can be seen from the severity of xerostomia which impact on the low quality of life.[27,28]

The results of this research are not the same as those of Shrivastava et al, which showed that HbA1C and plasma glucose levels of patients with type 2 DM affected on the severity of xerostomia and quality of life.[11] The difference between this research and Shrivastava's research is that the previous research shows that controlled type 2 DM patients had a good oral health-related quality of life and oral health. In contrast in this research, both controlled and uncontrolled type 2 DM patients had severe xerostomia, and poor oral health-related quality of life.

The limitation of this research is that researchers did not analyze the using of anti-diabetic drugs. Analysis of the use of different types of anti-diabetic drugs, the causes of the xerostomia that occurs can be clearer. There should be further research that analyze the effect of the use of anti-diabetic drugs on the xerostomia-related quality of life in type 2 diabetes patients.

CONCLUSION

There is no effect between xerostomia of controlled and uncontrolled type 2 DM patients with their quality of life.

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