JTS

The Journal of Transdisciplinary Studies, 4(2): 135-143, 2020
https://doi.org/10.22685/JTS.2020.4.2.135

Factors Related to the Quality of Life of Middle-aged and Senior Vulnerable Classes by Diabetes: Focusing on Oral Health and Nutritional Status*

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ARTICLE INFO

Article history:
Received 23 Nov 2020
Revised 11 Nov 2020
Accepted 14 Dec 2020

Keywords:
Diabetes,
Nutritional Status,
Oral Health,
Quality of Life,
Masticatory Movement Discomfort,
Vulnerable Classes

ABSTRACT

The purpose of this study is to identify factors related to quality of life, focusing on oral health and nutritional status of vulnerable elderly people. A total of 368 middle and high-aged people aged 45 or older were selected as subjects of the study by conducting a full survey of vulnerable residents registered in the C-City Health and Living Center. From October 10 to December 20, 2019, the quality of writing, pronunciation, nutrition, subjective health, and quality of life were measured through a visit interview using structured questionnaires. There was a significant difference in the quality of life for the subjects (P = 0.003) between diabetes (2.93) and non-diabetic (3.09). The greater the discomfort of masticatory movement and pronunciation, the lower the quality of life (r = -0.239, r = -0.241), the higher the nutritional state, the higher the quality of life (r = 0.345). For diabetes, the factors affecting quality of life were subjective health (β = 0.376, P < 0.001), masticatory movement discomfort (β = -0.277, P = 0.049), nutritional status (β = 0.252, P = 0.005), and the modified explanation of the model was 29.1%. Overall, the quality of life of diabetics was an important factor in masticatory movement discomfort and nutrition. Therefore, it is suggested that a strategy is necessary to carry out proper oral health care in diabetes care.

* This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A5A2A01027069), and was supported by the Cheonan-si Public Health Center project in 2019.

1. Introduction

Health problems are highlighted by the rapid extension of human life expectancy due to the significant improvement and advancement of health care and social environment such as medical technology, environmental hygiene, and living standards. In particular, the number of diabetics worldwide is increasing rapidly, and the prevalence rate of diabetes in Korea is also steadily increasing due to the westernization of diet, lack of exercise, increased stress and aging (Shin et al., 2011). According to the National Health and Nutrition Survey released in 2015, 1 in 10 adults over the age of 30 had diabetes and 63.4% of those who had diabetes were aged 60 or older. (Korea Centers for Disease Control and Prevention, 2017). Diabetes is a major leading disease of cardiovascular disease along with high blood pressure. In addition to medication, self-care is needed in daily life such as diet, exercise, and stress management. Also, proper self-care is related to proper blood sugar control, reduced complications, and improved quality of life (Ko et al., 2011).

Quality of life (QOL) refers to the degree of satisfaction not only by objective degree of one's life but also by subjective perception and evaluation of one's own welfare or happiness (Choi et al., 2015). It is clear that health, one of the most basic human needs, is a significant part of this quality of life, and there have been many technologies and developments, including medical technology, to improve the quality of life (Choi et al., 2015). Also, most modern welfare states aim to improve the quality of life of members of society and in Korea, the public's interest in quality of life is also being increased (Choi et al., 2015).

The importance of oral health is increasingly emphasized in the process of reviewing health issues, as it has been revealed that oral health is closely related to health of whole body (Gil-Monoya et al., 2015) and serves as a determinant of quality of life. In particular, oral health is recognized to have a significant impact on health of whole body and quality of life in the elderly, and in a state of weakness due to retrogenesis, loss of oral health has a significant impact on the willingness to live (Cassolato & Turnbul, 2003). Oral health is also interdependent with nutrition (Tada & Miura, 2004), and malnutrition not only intensifies oral infection but also affects food choices, affecting major nutrients in the blood. (Iwasaki et al., 2014). Vulnerable middle-aged and elderly people often have serious oral problems (Yang et al., 2016) and are reported to have poor overall nutrition (Tada & Miura, 2004).

In prior studies, many studies of the association between diabetes and periodontal disease (Khader et al., 2006; Jung et al., 2011; Won et al., 2014) and the effect of oral health on quality of life (Choi et al., 2015) have been conducted. However, there are no studies that have identified the link between oral health levels and quality of life, such as masticatory movement discomfort or pronunciation discomfort, among the vulnerable groups in Korea.

Therefore, this study was designed to contribute to the improvement of the quality of life of diabetics by assessing the level of discomfort in masticatory movement and pronunciation and nutrition in daily life and identifying interrelationships with quality of life.

2. Materials and Methods

2.1 Study design

This study is a descriptive cross-sectional survey study that analyzes oral health and nutritional status in factors related to quality of life caused by diabetes in 45 year olds through a study on the demands of the vulnerable in some communities.

2.2 Study participants

A total of 460 vulnerable people living in the area under the jurisdiction of the S Health and Living Center in Cheonan-si were surveyed, and 368 middle and high-aged people aged 45 or older were selected as subjects of this study. The guidelines under the Helsinki Declaration were followed for ethical consideration of those who were studied and were reviewed by the Public Bioethics Committee of the Ministry of Health and Welfare (IRB No. P01-201709-11-003).

2.3 Variables and measurement

From October 10 to December 20, 2019, the entire survey was conducted using a structured questionnaire with Visit Interview method for vulnerable people living in the jurisdiction of the S Health and Living Center at C City. Two trained investigators visited the house where vulnerable elderly people registered in the public health center reside and explained the purpose of the survey to seek voluntary consent before conducting the survey.

The survey items were examined for gender, age, level of education, economic level and type of residence, occupational status and diabetes due to demographic characteristics. The main independent variables are subjective health, oral health (masticatory movement discomfort and pronunciation discomfort) and nutritional status. Dependent variables investigated the quality of life.

Oral health levels were measured on a five-point scale (“not at all = 1” to “very much yes = 5”) using the masticatory movement discomfort and pronunciation discomfort indicators used by the National Health & Helpare, Korea Centers for Disease Control & Prevention, 2011. This means that the higher the score, the lower the oral health level. Subjective health conditions and nutritional conditions were measured on a 5-point scale (“Not at all = 1” to “Very Yes = 5”), and the higher the score, the better the health and nutrition conditions.

The quality of life (WHOQOL-BREF) consists of 26 items, developed by Min et al (2000) and used questions that have been validated against WHOQOL for feasibility and reliability. The measurement was measured on a 5-point scale of the Likert-type scale (“Not at all = 1” to “Very Yes = 5”), indicating that the higher the average score, the higher the quality of life, and the Cronbach’s α was 0.876.

2.4 Statistical analysis

The collected data were obtained from frequency analysis and technical statistics using the SPSS

23.0 program, and differences in oral health level, subjective health awareness, nutritional status, and quality of life were obtained via Independent t-test.The association between the measurement variables performs Pearson's correlation analysis and the associated factors that affect the quality of life are implemented by multiple regression.

3. Results and Discussion

Today's highly advanced medical technology increases the rate of treatment for diseases and extends the lifespan of humans, raising interest in quality of life beyond simple food, clothing, and shelter (Choi et al., 2015).

This study identified the quality of life, masticatory movement discomfort and pronunciation discomfort, poor nutrition, and subjective health levels of middle-aged people due to diabetes in a health needs survey at a health center in a public health center, and tried to identify related factors that affect their correlation and quality of life.

The general characteristics of vulnerable middle-aged and elderly people are as shown in Table 1.

Table 1. Participants' general characteristics

Variables	Category	N	%
Age	45-54	34	9.2
	55-64	86	23.4
	≥ 65	248	67.4
Sex	Male	100	27.2
	Female	268	72.8
Education level	≤ Elementary school	228	62.0
	Middle school	38	10.3
	High school	88	23.9
	College and above	14	3.8
Economy level	High	3	0.8
	Middle	119	32.3
	Low	246	66.8
Residence type	Single	196	53.4
	In family	112	30.6
	Others	59	16.1
Occupational status	Yes	77	20.9
	No	291	79.1
Diabetes	Yes	104	28.3
	No	264	71.7

Those aged 65 or older accounted for 67.4 percent, followed by 55-64 (23.4 percent) and 45-54 (9.2 percent). Women outnumbered men (27.2 percent) with 72.8 percent related to gender characteristics. When it comes to education level, elementary school is the highest level of schooling with 62 percent. Living alone accounted for 53.4 percent, followed by cohabitation with family (30.6 percent). The economic level was the lowest with 66.8 percent, and 79.1 percent were un-

employed, which is attributed to the large number of elderly people. Among them, 28.3 percent had diabetes.

Table 2 is a descriptive statistic for factors related to the quality of life of the vulnerable elderly.

The quality of life of vulnerable middle-aged and elderly people was 3.04 points, which is average. At the oral health level, the level of masticatory movement discomfort (3.05) was moderate, but slightly higher than the level of pronunciation discomfort (2.60). Nutrition was normal at 3.35, but subjective health was low at 2.83 points.

Table 2. Descriptive statistics of variables

Variables	n	Min	Max	Mean±SD
Quality of life	368	1.88	4.85	3.04±0.43
Masticatory movement Discomfort	368	1.00	5.00	3.05±1.39
Pronunciation Discomfort	368	1.00	5.00	2.60±1.30
Nutritional status	368	1.00	5.00	3.35±0.83
Perceived health	366	1.00	5.00	2.81±0.99

The comparative analysis result of the differences in factors related to the quality of life of middle and high-aged people in the vulnerable class due to diabetes is as shown in Table 3. The quality of life was average, 3.04 out of a maximum of 5 points, but the number of diabetes (2.93 points) was significantly lower than that of non-diabetic (3.09 points) ($P = 0.003$). For oral health levels, the masticatory movement discomfort of diabetes (3.28 points) was significantly higher than non-diabetic (2.96 points) ($P = 0.047$). Diabetes (2.96 points) was higher than non-diabetic (2.45 points) even in pronunciation discomfort ($P = 0.001$). This was consistent with the results of Choi et al. (2015) that diabetics had low oral health levels and poor quality of life.

Considering the fact that subjective health results in a significantly lower level of diabetes (2.52 points) than non-diabetic (2.93 points) out of 5 ($P < 0.001$, $P = 0.001$), Active measures were needed to improve the health of those who had metabolic syndrome such as diabetes. No difference in nutritional status due to diabetes ($P > 0.05$).

Table 3. Comparison of factors related to the quality of life of the elderly in the vulnerable class by diabetes

Variables	Have diabetes	No diabetes	P-value
	Mean±SD (n = 104)	Mean±SD (n = 264)	
Quality of life	2.93±0.43	3.09±0.47	0.003
Masticatory movement discomfort	3.28±1.31	2.96±1.42	0.047
Pronunciation discomfort	2.96±1.25	2.45±1.26	0.001
Nutritional status	3.30±0.75	3.38±0.85	0.422
Perceived health	2.52±1.00	2.93±0.96	< 0.001

P-value was calculated by independent t-test at α =0.05

The correlation between factors related to the quality of life of the vulnerable elderly is as shown in Table 4.

The greater the discomfort of masticatory movement and pronunciation, the lower the quality of life (r = -0.239, r = -0.241), the higher the nutritional state, the higher the quality of life (r = 0.345). In addition, the better subjective health awareness, the higher the quality of life (r = 0.421). The discomfort of masticatory movement was associated with a pronunciation discomfort positvely (r = 0.725), but was found to be negatively related to nutrition and subjective health (r = -0.181, r = -0.237). The greater the discomfort in pronunciation, the lower the nutritional status (r = -0.201) with negative relation, but the better the nutritional status, the higher the subjective health (r = 0.280) with positive relation. The results of the study which indicated that discomfort of masticatory movement was negatively related to quality of life were similar to those of Sin & Jung (2012)'s studies which showed that discomfort of masticatory movement is not only directly influential oral health characteristics, but also to a variety of factors such as personal, physical and psychological characteristics.

Table 4. Correlation among factors related to quality of life

Variables	1	2	3	4
1. Quality of life	1			
2. Masticatory movement discomfort	-0.239**	1		
3. Pronunciation discomfort	-0.241**	0.725**	1	
4. Nutritional status	0.345**	-0.181**	-0.097	1
5. Perceived health	0.421**	-0.237**	-0.201**	0.280**

**P < 0.01 by pearson correlation analysis at α =0.05

Table 5 is the result of a multiple linear regression analysis on factors that affect the quality of life for middle-aged and elderly people in vulnerable groups due to diabetes.

The different regression models for diabetes were shown to be significant (diabetic: F = 11.259, P < 0.001, non-diabetic: F = 21.998, P < 0.001). For diabetes, the factors affecting quality of life were subjective health (β = 0.376, P = 0.001), masticatory movement discomfort (β = -0.277, P = 0.049), nutritional status (β = 0.252, P = 0.005), and the modified explanation of the model was 9.1%. In particular, it has been shown that masticatory movement discomfort has a negative impact, and that nutritional status and subjective health have a positive effect. Factors affecting the quality of life of non-diabetic groups were subjective health (β = 0.291, P = 0.001), nutritional status (β = 0.233, P < 0.001) and pronunciation discomfort (β = -0.206, P = 0.009) with 24.4% of the modified explanations.

In this study, oral health levels such as masticatory movemen discomfort and pronunciation discomfort, were identified as factors affecting quality of life, indicating that oral health problems would reduce quality of life and negatively affect well-being in prior research. (Bramantoro et al, 2020) Therefore, we could confirm reports that these are becoming important health assessment indicators (Locker et al., 2001).

Table 5. Factors related to the quality of life of the middle-aged and elderly in the vulnerable class according to diabetes

Variables	Have diabetes*			No diabetes**		
	B	β	P-value	B	β	P-value
Constant	2.220		< 0.001	2.398		< 0.001
Masticatory movement discomfort	-0.084	-0.277	0.049	0.013	0.027	0.601
Pronunciation discomfort	0.063	0.196	0.155	-0.068	-0.206	0.009
Nutritional status	0.136	0.252	0.005	0.113	0.233	< 0.001
Perceived health	0.150	0.376	< 0.001	0.148	0.291	< 0.001

P-value was calculated by multiple regression analysis at α =0.05;
* F = 11.259, P < 0.001, Adjust R^2 = 0.291; **F = 21.998, P < 0.001, Adjust R^2 = 0.244

Since diabetes is a chronic disease with a high prevalence rate and continuous management is essential, the health center provides continuous health care by providing direct service through customized visiting health care projects and regular monitoring. (Kim et al., 2014). The results of the study were based on a survey of visit interviews with subjects by the Health and Life Center of the Public Health Center for health needs survey. Oral health problems in diabetic patients are often reported to be severe periodontal disease, including oral dryness (Khader et al., 2006; Jung et al., 2011; Won et al., 2014). In this study, the quality of life of middle-aged people with diabetes was found to be a significant factor in masticatory movement discomfort or nutrition. Kim et al. (2019) said that the eight-week oral health intervention program for diabetic elderly patients was effective in increasing oral self-care knowledge and the number of daily brushing. In other words, in order to improve the quality of life of diabetic patients, tight networking and support expansion of related organizations, communities and countries are needed spreading the importance of oral health through more emphasis on health improvement programs.

The significance of this study is expected to help establish strategies to provide customized oral health interventions by identifying oral health-related characteristics and nutritional conditions of diabetes in vulnerable middle and high-aged people and by identifying their impact on quality of life. However, the factors affecting the quality of life of middle-aged and elderly people due to diabetes are insufficient as a result of quantitative analysis measured by subjective oral health indicators and subjective nutritional conditions. Since it is a cross-sectional study of some vulnerable groups, there was a limit to the possibility of selective bias. We suggested that in future studies, end-to-end studies of more diverse factors related to quality of life or experimental studies of the effects of running actual oral health programs should be conducted. That is, through this study, the following is suggested : First, repeated studies are needed to identify factors related to the quality of life for older people with diabetes in the vulnerable. Second, various intervention studies are needed to improve oral health of older people with diabetes.

4. Conclusion

In this study, vulnerable middle-aged and elderly people were found to have low oral health

and nutritional status and their quality of life was also low. It is suggested that the importance of oral health care in diabetes management for vulnerable middle-aged and elderly people needs to be further emphasized to expand the program to form the correct oral health lifestyle especially regarding the fact that factors affecting the quality of life of diabetes have been shown to be discomfort in masticatory movement, nutritional status and subjective health.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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