

# Progress in Research of Oral Health in Patients with Type 2 Diabetes Quality of Life Impact

Jin Jiao, Rui Pang\*, Yanling Li

Affiliated Hospital of Hebei University, Baoding 071000, Hebei Province, China

\*Corresponding author: Rui Pang, pang1523128992@163.com

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**Abstract:** Multiple studies have demonstrated that oral health quality of life (OHQOL) in patients with type 2 diabetes (T2DM) is affected by multiple factors. Therefore, during this study the related factors of OHQOL for T2DM was reviewed, and analyzed them from the aspects of socio-demographic factors, T2DM related factors and oral health related factors. This was to provide basis for nursing workers to develop personalized nursing measures.

**Keywords:** Type 2 diabetes; Oral health quality of life; Influencing factors; Review

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## 1. Introduction

Diabetes mellitus (DM) is divided into type 1 Diabetes mellitus, type 2 Diabetes mellitus, gestational Diabetes mellitus and other types of Diabetes mellitus, where T2DM is the majority in China. High levels of blood sugar in the body leads to a variety of complications, including oral complications. DM and periodontal disease interacts to form a vicious circle, but it hasn't gotten the clinical or patient attention it deserves <sup>[1]</sup>. As clinical medical staff, attention should be paid to the oral health status of patients with T2DM and to improve the oral health quality of life of patients with T2DM.

## 2. Related concepts

### 2.1. Type 2 diabetes

T2DM is characterized by progressive blood glucose elevation, and blood vessels and nerves are filled with high blood glucose for a long time, which is prone to various complications <sup>[2]</sup>. Oral cavity is the most vulnerable site to be affected by blood glucose, and most of them have the problem of xerostomia, among which the incidence of periodontal disease is the highest <sup>[3]</sup>.

### 2.2. Oral health and quality of life

Different researchers have proposed different concepts for oral health quality of life (see **Table 1.**).

### 2.3. The relationship between diabetes mellitus and oral health quality of life

The incidence of periodontal disease in DM patients is significantly higher than that in non-DM patients <sup>[4]</sup>. T2DM has a bidirectional relationship with OHQOL <sup>[5]</sup>, that is, T2DM can lead to an increased incidence of oral diseases, and poor oral health status leads to poor blood glucose control.

The mechanism of diabetes mellitus and oral health quality of life are related to the interaction of multiple systems:

- (1) The effects of T2DM on OHQOL: The salivary gland was damaged; Oral infection; Plasma adiponectin levels changes, whereby DM leads to periodontal vascular damage and weakened

mucosal repair, leading to more oral diseases [4].

- (2) Effects of OHQOL on T2DM: Low degree inflammation where, periodontitis leads to increased activity of inflammatory factors in the oral cavity, leading to decreased sensitivity to insulin, and aggravating insulin resistance [4]. For tooth loss, the existence of periodontitis leads to fragile tooth matrix, then masticatory dysfunction, followed by nutritional disorders, resulting in poor blood sugar control.

**Table 1.** The concept of oral health quality of life

Years	Author	Concept
1993	Dolan T, et al	Oral health is defined as a comfortable and well-functioning dentition that enables individuals to continue to perform their desired social roles.
1997	Gift HC, et al	These include survival (no presence of oral cancer); Free from damage and disease; No discomfort or pain associated with chewing or swallowing; Emotional functions related to smiling; Social functions related to normal roles; Perception and satisfaction with oral health; And lack of social or cultural disadvantage due to oral conditions.
2000	Locker D, et al	Consideration needs to be given to the measurement of clinical indicators of oral disease, the functional and psychosocial implications of oral condition, and mental health and life satisfaction.
2011	Inglehart MR, et al	Consideration should be given to the individual's assessment of how the following factors affect their health: functional factors, psychological factors, social factors, and oral and facial pain/discomfort experiences.

### 3. Influencing factors of OHQOL in T2DM patients

#### 3.1. Sociodemographic elements

##### 3.1.1. Age

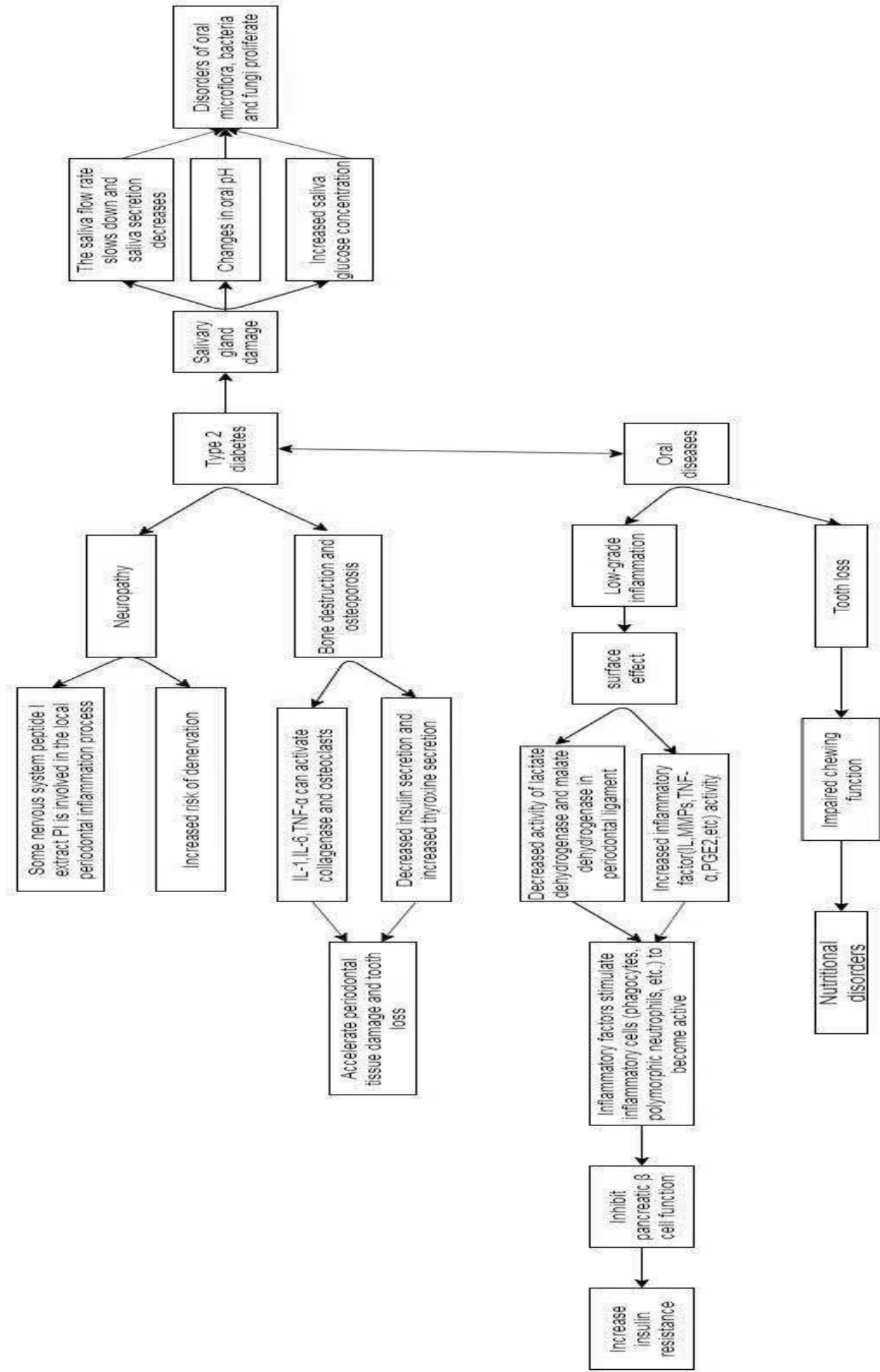
Age increases the risk of periodontitis in DM patients [6]. However, some studies have found that the relationship between DM and tooth loss is closer in the younger group ( $\leq 65$  years old) than in the older group ( $\geq 65$  years old) [7]. Age is a factor affecting of OHQOL, but the tendency of different ages to suffer from oral diseases and the ways through which age factors affect oral health still need to be further studied.

##### 3.1.2. Gender

The prevalence of moderate and severe periodontitis in males is higher than that in females [8]. However, some studies have found that although the rate of tooth loss in males is higher than in females, this correlation is not significant [9]. Therefore, gender is an influential factor of oral health quality of life in patients with T2DM, which still needs some evidence to support.

##### 3.1.3. Body Mass Index (BMI)

Most patients with T2DM are obese. The mean gingival atrophy of obese people is higher than of non-obese people [10]. BMI in patients with T2DM is correlated with periodontitis and tooth loss [11,12]. In conclusion, BMI is an important risk factor for the deterioration of oral health quality of life in patients with T2DM.



**Figure 1.** The relationship between diabetes and oral health quality of life

### **3.1.4. Education level**

Studies have shown that education level is significantly correlated with the number of missing teeth <sup>[13]</sup>, and poor school education is an important factor for the occurrence of periodontal disease in patients with T2DM <sup>[14]</sup>. People with higher education level have better oral health and life quality <sup>[15]</sup>.

### **3.1.5. Income status**

Family income is one of the determinants affecting the oral health quality of patients with T2DM <sup>[9]</sup>. The higher the income, the better the oral health status <sup>[16]</sup>. It is necessary to strengthen the support for T2DM patients with poor economic income and improve their awareness and material basis of oral health care.

### **3.1.6. Dental insurance**

Dental insurance plays an important role in the oral health of T2DM patients <sup>[17]</sup>. Dental insurance can protect the oral health of T2DM population and reduce their economic burden.

## **3.2. T2DM related factors**

### **3.2.1. T2DM duration**

Some scholars have found that the duration of T2DM is significantly correlated with periodontal index <sup>[18]</sup>, while Han, K et al. <sup>[6]</sup> did not find the relationship between periodontitis and the duration of T2DM. Different researchers hold different conclusions about the effect of the course of T2DM on oral health.

### **3.2.2. T2DM self-management**

Studies have shown that patients with good blood glucose control have higher OHQOL than those with poor blood glucose control, and periodontal treatment is beneficial to blood glucose control in patients with T2DM<sup>[7]</sup>. Zhu Meihong et al. <sup>[19]</sup> believed that OHQOL of DM patients with good treatment compliance was higher than those with poor compliance. Therefore, T2DM patients should pay attention to self-management of controlling blood glucose level to improve OHQOL.

## **3.3. Factors related to oral health**

### **3.3.1. Oral health knowledge and attitude**

People with good knowledge of oral health have better OHQOL <sup>[20]</sup>. T2DM patients with positive attitudes towards periodontal health have better glycemic control <sup>[21]</sup>. In conclusion, oral health knowledge and attitude can affect the oral health quality of life of T2DM patients.

### **3.3.2. Oral health behavior**

The study found that T2DM patients with periodontal treatment experience pay more attention to tooth cleaning <sup>[21]</sup>. The use of secondary oral products can reduce the incidence of periodontitis in T2DM <sup>[6]</sup>. Oral health behaviors of DM patients in China are generally poor <sup>[19,22]</sup>. Therefore, medical staff should guide DM patients to pay attention to and strengthen good oral health behaviors to improve OHQOL.

### **3.3.3. Oral health resources**

Studies have shown that regular periodontal follow-up can improve oral health quality of life in 91% of patients <sup>[23]</sup>. Access to oral health resources for T2DM patients should be facilitated through various means.

## **4. Conclusion**

In conclusion, oral health quality of life of patients with T2DM is affected by a variety of factors, mainly including socio-demographic factors, T2DM related factors and oral health related factors. Although the influencing factors of oral health quality of life include uncontrollable factors such as age and gender, we can improve the oral health quality of life of T2DM patients by changing the controllable factors.

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## Disclosure statement

The author declares no conflict of interest.

This review article cites the peer-reviewed manuscripts of other groups. This review does not include a study design with the direct ethical statements of the human or animal study designs.

## Author contributions

Li YL, Wang XJ, and Yan YQ conceptualized the questions and developed protocol for the review article. Zhang LL, Yu GF and Wang YL wrote writing-original draft preparation. Li YL critically reviewed and edited the manuscript. All authors have read and given final approval of the article to be published.

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