

INPLASY

The Impact of Oral Health Education on the Oral Health Status of Elderly Patients with Type 2 Diabetes: A Systematic Review and Meta-Analysis

INPLASY202680054

doi: 10.37766/inplasy2026.8.0054

Received: 13 August 2026

Published: 13 August 2026

Yan, QY; Chen, Y; Ying, CC.

Corresponding author:

Chongchong Ying

yingcc2026ycc@163.com

Author Affiliation:

Shaoxing Stomatological Hospital.

ADMINISTRATIVE INFORMATION**Support** - No support.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202680054**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 August 2026 and was last updated on 13 August 2026.**INTRODUCTION**

Review question / Objective To evaluate the effect of structured oral health education (≥ 3 months, including oral health knowledge instruction, proper toothbrushing/flossing training, oral cleaning aid guidance, and regular dental examination promotion) on oral health status, glycemic control, and oral health-related quality of life in elderly patients (≥ 60 years) with type 2 diabetes mellitus (T2DM), compared with conventional diabetes health education (diet, exercise, blood glucose monitoring, and general complication prevention).

Condition being studied A close bidirectional relationship exists between type 2 diabetes mellitus (T2DM) and oral health. Metabolic disturbances, immune dysfunction, and microvascular complications related to T2DM significantly increase the risk of periodontitis, dental caries, and oral fungal infections.¹ Chronic periodontal inflammation further aggravates insulin resistance through systemic inflammatory

mediators, forming a pathological vicious cycle. The global prevalence of T2DM is rising continuously, and more than 90% of patients present with oral complications. Elderly individuals are particularly vulnerable due to aging, physical decline, and insufficient self-care ability.

METHODS

Participant or population Patients diagnosed with T2DM according to the World Health Organization 1999 criteria, aged ≥ 60 years, irrespective of gender, disease duration, or glycemic control level.

Intervention Oral health education provided in addition to the control intervention, with a duration exceeding 3 months. Methods included: (i) providing oral health knowledge education to raise awareness; (ii) instructing on correct and effective toothbrushing techniques; (iii) guiding the proper use of oral cleaning aids; (iv) instructing and encouraging regular dental check-ups.

Comparator Routine diabetes health education, including guidance on daily diet and exercise, instruction on self-monitoring of blood glucose, and lectures on preventing common T2DM complications.

Study designs to be included A total of 1,205 relevant articles were initially screened. After removing duplicates, 725 articles were obtained. 602 articles were excluded as they were reviews, case studies, etc. 84 articles were excluded based on their titles and abstracts as they clearly did not match the topic. 39 articles were selected for full-text reading, and 10 were excluded as they were not RCT studies. 4 articles were excluded because they did not have extractable and integrable data. 7 articles were excluded due to the presence of other complications in.

Eligibility criteria Inclusion Criteria:

1. Study Type: Randomized controlled trials (RCTs), regardless of blinding.
2. Participants: Patients diagnosed with T2DM according to the World Health Organization 1999 criteria, aged ≥ 60 years, irrespective of gender, disease duration, or glycemic control level.
3. Intervention: Oral health education provided in addition to the control intervention, with a duration exceeding 3 months. Methods included: (i) providing oral health knowledge education to raise awareness; (ii) instructing on correct and effective toothbrushing techniques; (iii) guiding the proper use of oral cleaning aids; (iv) instructing and encouraging regular dental check-ups.
4. Control: Routine diabetes health education, including guidance on daily diet and exercise, instruction on self-monitoring of blood glucose, and lectures on preventing common T2DM complications.
5. Outcome Measures: Oral infection, gingival bleeding, oral pain, tooth loss, glycated hemoglobin (HbA1c) level. Clinical indicators of periodontal health included plaque index score, gingival index score, and clinical attachment level (CAL). The Geriatric Oral Health Assessment Index (GOHAI) was used to assess oral health-related quality of life. This scale comprises 12 items across four domains: oral physiological function, pain and discomfort, psychological function, and behavioral impact. Each item is scored from 1 to 5, with a total score ranging from 12 to 60. A lower total score indicates better quality of life.

Exclusion Criteria:

1. Patients with severe complications of T2DM or other serious physical diseases such as stroke, myocardial infarction, malignant tumors were excluded. (Reason: Severe complications or other serious diseases may affect the patient's oral

health status, compliance with intervention measures, and outcome indicators, leading to confounding biases that interfere with the evaluation of the effect of oral health education.)

2. Patients who are unable to communicate, have dementia, are in a coma, have missing teeth or have no teeth in the entire mouth, or have oral diseases caused by trauma were excluded.

3. Patients with severe oral inflammation were excluded.

4. Case reports, reviews, literature with incomplete data or where all data cannot be obtained, or literature that has been repeatedly published were excluded. (Reason: Case reports and reviews do not meet the RCT study type required by this research; incomplete data cannot be used for meta-analysis, and duplicate publications will lead to data redundancy and bias.).

Information sources A systematic search was conducted across five English databases (PubMed, the Cochrane Library, EMBASE, Web of Science, The National Library of Medicine) and four Chinese databases (China National Knowledge Infrastructure [CNKI], Wanfang Database, China Biology Medicine disc, VIP Chinese Sci-tech Journal Full-text Database).

The search terms included: "elderly", "Type 2 diabetes mellitus", "T2DM", "oral health education", "dental health education", "oral hygiene instruction", "randomized controlled trial". The search covered the period from database inception to December 31, 2025, and was supplemented by manual searches of the reference lists of included studies. The search strategy employed a combination of subject headings and free-text terms, which was finalized after several pilot searches. Additionally, a grey literature search was performed. This involved contacting experts in the field and corresponding authors of relevant studies to obtain important information not captured by the database searches; manually searching relevant journals and books; and examining the reference lists of included studies to identify additional pertinent literature.

Main outcome(s) Oral infection, gingival bleeding, oral pain, tooth loss, glycated hemoglobin (HbA1c) level. Clinical indicators of periodontal health included plaque index score, gingival index score, and clinical attachment level (CAL). The Geriatric Oral Health Assessment Index (GOHAI) was used to assess oral health-related quality of life. This scale comprises 12 items across four domains: oral physiological function, pain and discomfort, psychological function, and behavioral impact. Each item is scored from 1 to 5, with a total score

ranging from 12 to 60. A lower total score indicates better quality of life.

Quality assessment / Risk of bias analysis The risk of bias in randomized controlled trials was assessed using the tool recommended by the Cochrane Handbook 5.1.0. The evaluation contents included: 1. Random sequence generation; 2. Allocation concealment; 3. Blinding of participants and personnel; 4. Blinding of outcome assessment; 5. Incomplete outcome data; 6. Selective reporting; 7. Other bias. Each criterion is evaluated using "low risk bias, high risk bias, and unclear". The quality of the literature is classified into 3 levels: A, B, and C. A level indicates complete compliance with the criteria, B level indicates partial compliance, and C level indicates complete non-compliance. In case of disagreement in the evaluation results, the third researcher will be consulted. Although this study included RCTs regardless of blinding status, blinding assessment was still performed because blinding is an important indicator for evaluating the risk of bias in RCTs—even unblinded studies need to clearly state the lack of blinding, which helps readers judge the reliability of the study results. Each criterion is evaluated using "low risk bias, high risk bias, and unclear". The quality of the literature is classified into 3 levels: A, B, and C. A level indicates complete compliance with the criteria, B level indicates partial compliance, and C level indicates complete non-compliance. In case of disagreement in the evaluation results, the third researcher will be consulted.

Strategy of data synthesis The meta-analysis was performed using Review Manager 5.4.1 (RevMan; The Cochrane Collaboration, London, UK). For dichotomous data, the odds ratio (OR) was used as the effect measure, while for continuous data, the standardized mean difference (SMD) was used. All effect sizes are presented as point estimates with their 95% confidence intervals (CI). Heterogeneity was assessed using the I^2 statistic. An I^2 .10 was considered indicative of acceptable homogeneity, and a fixed-effects model (Mantel-Haenszel method) was applied for analysis. If I^2 was $\geq 50\%$ or $P \leq .10$, significant heterogeneity among the included studies was assumed, and a random-effects model (DerSimonian-Laird method) was used. Publication bias was assessed using funnel plots.

Subgroup analysis The meta-analysis was performed using Review Manager 5.4.1 (RevMan; The Cochrane Collaboration, London, UK). For dichotomous data, the odds ratio (OR) was used as the effect measure, while for continuous data,

the standardized mean difference (SMD) was used. All effect sizes are presented as point estimates with their 95% confidence intervals (CI). Heterogeneity was assessed using the I^2 statistic. An I^2 .10 was considered indicative of acceptable homogeneity, and a fixed-effects model (Mantel-Haenszel method) was applied for analysis. If I^2 was $\geq 50\%$ or $P \leq .10$, significant heterogeneity among the included studies was assumed, and a random-effects model (DerSimonian-Laird method) was used. Publication bias was assessed using funnel plots.

Sensitivity analysis Sensitivity analysis was conducted by sequentially removing individual studies to evaluate the influence of each included study on the pooled effect estimate. For each outcome measure, a meta-analysis was performed only if data from at least two independent studies were available for pooling. If data for a specific outcome were reported by only a single study, a systematic qualitative description was provided instead. The significance level for the meta-analysis was set at $\alpha = .05$.

Country(ies) involved China, Thailand.

Keywords Oral health education; Type 2 diabetes; Healthstatus.

Contributions of each author

Author 1 - Qiaoyi Yan.

Author 2 - Ying Chen.

Author 3 - Chongchong Ying.