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Influence of Ti-base supported implant restoration on peri-implant health: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 January 2024 and was last updated on 19 January 2024.

INTRODUCTION

Review question / Objective To investigate the influence of titanium base abutment on peri-implant health.

Rationale The combination of titanium base and zirconia material has broadened the scope of crown and abutment design in the context of single-tooth implant-supported restorations However, the influence on peri-implant health was inconclusive. Therefore, we would like to perform a systematic review and meta-analysis to investigate the influence of titanium base abutment on peri-implant health.

Condition being studied The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: human participants; (2) I: single implant-supported restoration with Ti-base abutment; (3) C: single implant supported-restoration with regular abutment; and (4) O: changes in the peri-implant marginal bone level.

METHODS

Search strategy Two authors (H.-P.L. and S.-Y.C.) made independent electronic searches in the PubMed, Embase, and ClinicalTrials.gov with keyword of ("Ti-base" OR "titanium base" OR "titanium-base abutment" OR "Ti-insert" OR "Ti-adaptor" OR "hybrid abutment" OR "hybrid-abutment-crown" OR "hybrid implant-supported restoration" OR "two-piece abutment" OR "angulated screw channels" OR "angulated screw-retained" OR "ASC abutment" OR "screw-retained" OR "screwmentable") through the earliest record to Oct 6, 2023.

Participant or population Human participants.

Intervention Single implant-supported restoration with Ti-base abutment.

Comparator Single implant-supported restoration with one-piece abutment.

Study designs to be included Rcandomized controlled trials.

Eligibility criteria To generate a recruited study list, the following inclusion criteria will be used: 1) randomized controlled trials (RCTs) enrolling human participants, 2) RCTs investigating the quantitative evaluation of peri-implant marginal bone loss, 3) trials with available data for baseline and follow-up measurement or in peri-implant marginal bone loss, 4) studies use bone level implants, 5) follow-up time equal or more than 12 months.

Information sources Two authors (H.-P.L. and S.-Y.C.) made independent electronic searches in the PubMed, Embase, and ClinicalTrials.gov with keyword of ("Ti-base" OR "titanium base" OR "titanium-base abutment" OR "Ti-insert" OR "Ti-adaptor" OR "hybrid abutment" OR "hybrid-abutment-crown" OR "hybrid implant-supported restoration" OR "two-piece abutment" OR "angulated screw channels" OR "angulated screw-retained" OR "ASC abutment" OR "screw-retained" OR "screwmentable") through the earliest record to Oct 6, 2023.

Main outcome(s) The primary outcomes were the changes in the peri-implant marginal bone level following single implant-supported restoration treated with Ti-base abutment or one-piece abutment. The measurement of marginal bone level was recorded from the implant platform/shoulder to the most coronal visible bone-to-implant contact of each implant.

Additional outcome(s) The secondary outcome was prosthetic-related adverse event rates. The aforementioned outcomes were quantified by odds ratios.

Data management Two independent authors, H-PL and S-YC, conduct the data extraction process for the reviewed studies. The process involved extracting demographic information, study design parameters, specific clinical characteristics of each study group, and the primary and secondary outcome values.

Quality assessment / Risk of bias analysis To investigate the methodological quality of recruited studies, we used the Cochrane risk-of-bias tool for randomized trials, version 2 (RoB 2), which consisted of 6 main items: randomization process, intervention adherence, missing outcome data, outcome measurement, selective reporting, and overall risk of bias. In the intervention adherence section of RoB 2, there are two options for literature assessment: intention-to-treat (intervention assignment) or per-protocol (intervention adherence). In this meta-analysis, we chose the per-protocol evaluation, since it fits the design of our included studies.

Strategy of data synthesis Because of the heterogeneity of the target populations in the enrolled studies, the current meta-analysis was conducted with a random-effects model, using Comprehensive Meta-Analysis software, version 3 (Biostat, Englewood, NJ). A two-tailed p value less than 0.05 was considered statistically significant. We chose difference in means and 95% confidence intervals (CIs) to quantify the primary outcomes (changes in peri-implant marginal bone level). We chose odds ratios and their 95% CIs to investigate the secondary outcome (prosthetic-related adverse event rates).
The I2 and Cochran's Q statistics were used to evaluate the degree of heterogeneity among studies. An I2 value of 25%, 50%, and 75% was considered low, moderate, and high heterogeneity, respectively.

Subgroup analysis Subgroup analyses based on microthread implants and platform-switch implants were performed.

Sensitivity analysis To confirm the robustness of the meta-analysis, the sensitivity analyses were performed using one-study removal method to see if there was a significant change in the summary effect size after removing a particular trial from the analysis.

Language restriction No language limit.

Country(ies) involved USA and Taiwan.

Keywords Ti-base, titanium base, randomized, clinical trials, meta-analysis, systematic review.

Contributions of each author

Author 1 - Han-Pang Liu performed data searching, management and statistics, and also drafted the manuscript.
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Author 2 - Sieu Yien Chiam performed data searching, and created illustration.
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Author 3 - Hom-Lay Wang contributed the concept and criteria of the work, and led the writing.
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