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Effect of cognitive behavioral therapy on pain, knee function, and psychological status in patients after primary total knee arthroplasty: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Data analysis.

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 27 August 2023 and was last updated on 27 August 2023.

INTRODUCTION

Review question / Objective To evaluate the effect of cognitive behavioral therapy(CBT) on pain, knee function, and psychological status of patients after total knee replacement(TKA). P: Adult patients received primary unilateral TKA for knee osteoarthritis. I: Based on cognitive behavioral therapy principles or use cognitive behavioral therapy methods. C: no treatment or other interventions alone. O: Visual Analog Scale (VAS), numerical rating scale (NRS), American Knee Society knee score (KSS), Hospital for Special Surgery Knee Rating Scale (HSS), Tampa Scale of Kinesiophobia (TSK), Pain Catastrophizing Scale(PCS). S: The literature type must be a randomized controlled trial(RCT).

Rationale Total knee arthroplasty (TKA) is an effective method for treating end-stage knee osteoarthritis, which can effectively alleviate pain, improve knee joint function, and enhance the quality of life of patients. Despite ongoing improvements in surgical techniques, knee prosthesis designs, and postoperative rehabilitation concepts, patient dissatisfaction rates with TKA remain high, at around 20%. Postoperative pain and poor function are the most significant factors contributing to patient dissatisfaction. Research has indicated that pain and knee function after TKA are not solely linked to somatic pathological factors, but are also influenced by psychological and social factors, such as pain catastrophizing, fear of movement, patient attitudes, and pathological behavior.
Cognitive behavioral therapy (CBT) is a purposeful, planned, and structured psychological treatment strategy that intervenes with relevant somatic and psychological factors, corrects negative thinking, and improves mood to bring about gradual improvements in cognition and illness behavior. CBT can be helpful for managing pain and facilitating functional recovery after TKA. However, there are also studies indicating that CBT interventions may not improve postoperative pain and knee joint function compared to usual care.

To date, only one meta-analysis published in October 2022 has investigated the impact of CBT on postoperative pain and function after TKA. Additionally, between 2021 and 2023, several randomized controlled trials exploring the impact of CBT on post-TKA efficacy have been published. Therefore, this study collected all randomized controlled trials (7 RCTs) analyzing the impact of cognitive-behavioral therapy on post-TKA efficacy before February 2023 and used meta-analysis to systematically analyze the effects of CBT on pain, knee joint function, and psychological status of TKA patients postoperatively, providing an objective and reliable evaluation for clinical treatment and rehabilitation, serving as an evidence-based reference.

Condition being studied The included studies involved patients who underwent primary total knee arthroplasty (TKA) due to knee osteoarthritis. The research compared the effects of interventions based on cognitive-behavioral therapy principles or utilizing cognitive-behavioral therapy, with conventional care or no intervention, on post-TKA patients' pain, knee joint function, and psychological status.Based on cognitive behavioral therapy principles or use cognitive behavioral therapy methods.

METHODS

Search strategy We systematically searched electronic databases including China National Knowledge Infrastructure (CNKI), Web of Science (VIP), China Biomedical Literature (CBM), PubMed, EMBASE, and Cochrane Library. The search strategy used a combination of MeSH terms and free terms based on the following keywords: "Cognitive Behavioral Therapy", "Behavioral Therapies", "Arthroplasty, Replacement, Knee", "Knee Replacement Arthroplasty", "randomized controlled trial", and "randomized". The search strategy can be adapted to the different databases. To avoid potential omissions of relevant studies, the reference lists of included primary studies and relevant systematic reviews were also manually searched.

Participant or population Adult patients received primary unilateral TKA for knee osteoarthritis.

Intervention Experimental group: Based on cognitive behavioral therapy principles or use cognitive behavioral therapy methods.

Comparator No treatment or other interventions alone (non-cognitive behavioral therapy intervention).

Study designs to be included Randomized controlled trial(RCT).

Eligibility criteria Exclusion Criteria: (1) Animal experiments, case reports, conference abstracts, clinical trial registrations, reviews, and meta-analyses;(2) Significantly incomplete outcome data.

Information sources China National Knowledge Infrastructure (CNKI), Web of Science (VIP), China Biomedical Literature (CBM), PubMed, EMBASE, and Cochrane Library.To avoid potential omissions of relevant studies, the reference lists of included primary studies and relevant systematic reviews were also manually searched.

Main outcome(s) (1) Essential details of the study: (publication year, primary author, country, study type); (2) Demographic information of the participants: (age, gender, sample size); (3) Description of CBT intervention: (including duration, frequency, the background of implementers, and method of implementation); (3) Primary outcome measures: Pain intensity (VAS score, NRS score); Secondary outcome measures: Knee joint function (KSS score, HSS score), Psychological status (TSK score, PCS score).

Additional outcome(s) None.

Data management Two separate researchers collected the information from the included studies using a pre-designed Excel sheet, and the details will be recorded in the same Excel sheet.

Quality assessment / Risk of bias analysis Since all the included studies were randomized controlled trials, the risk of bias summary of the Review Manager Software (5.3, The Cochrane Collaboration, Denmark) was used to evaluate the methodological quality of each study. The assessors made high, unclear, or low-risk evaluations for each item based on the assessment criteria. The assessment was conducted independently by two assessors (KL and ZQF), and any disagreements were resolved through discussion with a third assessor (DLF).

Strategy of data synthesis The summary effect sizes for continuous variables were expressed as weighted mean differences (WMD) or standardized mean differences (SMD) (when there were inconsistencies in measurement units or methods), along with a 95% confidence interval. For binary variables, the summary effect sizes were expressed as relative risks (RR) and a 95% confidence interval. Hypothesis testing was

performed using the Z-test, and the statistical heterogeneity among the included studies was analyzed using the Cochrane Q test and I2 statistics. If there was no significant heterogeneity among the studies (I20.1), a fixed-effect model was used for meta-analysis. If there was significant heterogeneity (50%≥I2 or P≤0.1), a random-effects model was used to pool the effect sizes.

Subgroup analysis Subgroup analyses were conducted according to different follow-up times for the reported outcome measures.

Sensitivity analysis To evaluate the stability of the results, sensitivity analyses were undertaken by omitting one study at a time and noting changes in the combined effect size of the primary outcome measure.

Language restriction There are no language restrictions.

Country(ies) involved China.

Other relevant information None.

Keywords Cognitive behavioral therapy; Pain; Kinesiophobia; Catastrophizing; Total knee arthroplasty; Meta-analysis.

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