Effectiveness of Cognitive Functional Therapy Versus Standard Care in Chronic Low Back Pain Management: A Meta-Analysis

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Introduction

Chronic low back pain (CLBP), a musculoskeletal health problem[1], is a recognized and common cause of functional disability that prevents individuals from performing daily activities and creates social, medical, and economic burdens in their lives[5]. Studies have found that the prevalence of low back pain cases is approximately half a billion, posing a serious global burden[2]. Non-specific chronic low back pain affects individuals irrespective of age and is primarily considered a symptom rather than a disease[3]. CLBP is generally defined as persistent pain in the lumbar region without any apparent serious pathological medical conditions such as cancer, vertebral infection, or axial spondylarthritis[4]. The specific pathology causing low back pain is often difficult to identify. Therefore, multidimensional approaches, including both pharmacological and non-pharmacological strategies, have been employed to reduce the burden of chronic low back pain among patients[1]. However, these management approaches, as well as standard physical therapy, often fail to address the multidimensional nature of chronic low back pain, further emphasizing the need for more comprehensive and personalized treatment strategies[1].

Cognitive Functional Therapy (CFT) is an emerging intervention designed to address physical, psychological, and social barriers, enabling patients to self-manage chronic low back pain[6]. This flexible and integrated behavioral therapy incorporates a clinical reasoning framework, focusing on understanding the patient's story and behavior in relation to pain[7]. Recent studies suggest that CFT demonstrates superiority over standard care in improving outcomes such as functional

disability, pain intensity, and psychological well-being among patients with CLBP[8]. However, the overall effectiveness of this therapy remains underexplored and requires thorough evaluation through the synthesis of existing evidence. By analyzing data from six randomized controlled trials, this meta-analysis aims to systematically assess the efficacy of CFT in comparison to standard care for reducing functional disability in adults with chronic low back pain.

Methods

Study inclusion criteria

This meta-analysis included six randomized controlled trials (RCTs)[9-14] evaluating the effectiveness of cognitive functional therapy (CFT) for chronic low back pain in adults. The trials enrolled participants aged 18 to 75 years with a clinical diagnosis of persistent chronic low back pain lasting more than three months. All participants across the six trials were mostly working individuals who reported limitations in performing daily life activities.

Despite experiencing functional impairments, the participants were independently mobile and had been thoroughly examined to rule out major health conditions beyond chronic low back pain. They were identified as generally healthy without significant medical concerns. Additionally, many participants reported experiencing anxiety, depression, and mood swings due to the pain and functional disability caused by their condition. The pain was often triggered by postures, movements, and physical activities requiring significant physical effort.

Each of the six trials included two groups: intervention groups receiving cognitive functional therapy and control groups receiving standard or usual care. The primary outcome across all studies was the reduction of functional disability, while pain intensity was assessed as a secondary

outcome. Intervention details, including types, components, frequency, and duration, were recorded for each study and identified as clinic-based individual sessions incorporating three components: cognitive component, functional movement training, and lifestyle change.

All included RCTs were published in English to ensure consistency in interpretation and evaluation.

Study Exclusion Criteria

Studies were excluded for various reasons, primarily if they used non-randomized or quasi-experimental designs, case reports, or review articles, or if they did not report outcomes related to functional disability or employed non-CFT interventions as primary treatments. The exclusion criteria also eliminated studies involving patients with serious health conditions such as cancer, psychiatric disorders, neurological conditions, rheumatological diseases, or any condition that prevented participation in exercise. Additionally, studies not published in English were excluded. These exclusions ensured that the selected studies specifically addressed the research question and provided robust data on the effectiveness of CFT in reducing functional disability.

Search Strategy

A comprehensive search of two major databases, PubMed and Web of Science, was conducted. The search range was not restricted by publication date to capture the breadth of available evidence. The search strategy incorporated the following keywords and Boolean operators: ("Chronic low back pain" AND "Cognitive functional therapy" AND "Standard care") and ("Low back pain" AND "Randomized clinical trial"). Filters were applied to include only randomized controlled trials (RCTs), human studies, and publications in English. Additional studies were

identified through a manual search targeting interventions involving cognitive functional therapy and outcomes related to reducing functional disability.

Study Selection

To maintain transparency and replicability, the study selection process followed PRISMA guidelines. The initial screening of titles and abstracts aimed to identify studies that met the inclusion criteria, with the review process supported by RAYYAN, a specialized web-based tool for systematic reviews. Multiple database searches were conducted throughout October 2024 to ensure thorough coverage of relevant literature. Full-text reviews were performed for studies considered potentially eligible. Detailed reasons for exclusion were recorded, such as populations not aligning with predefined criteria or interventions differing from the research focus.

Data Extraction

The data for this meta-analysis were collected manually and organized in a Microsoft Excel spreadsheet. The dataset captured details about the studies, including publication information (authors, year, and study design), participant demographics (sample size, age, gender, geographic location, ethnicity, activity levels, and mental health status), intervention specifics (type, frequency, duration, components, follow-up period, and pre- and post-intervention values), and measurement details (how outcomes were defined, methods of assessment, and tools used for measurement). This meticulous approach ensured that only high-quality evidence was included to assess the effectiveness of cognitive functional therapy in reducing functional disability in adults with chronic low back pain.

Outcome Measure

This meta-analysis focused on reducing functional disability as the primary outcome in adults with chronic low back pain. The included studies assessed two groups: an intervention group that received cognitive functional therapy (CFT) and a control group that followed standard care. Functional disability was measured using two well-established tools: the Roland Morris Disability Questionnaire (RMDQ) and the Oswestry Disability Index (ODI). These instruments provided pre- and post-intervention mean scores and standard deviations, allowing for a quantitative comparison of changes in disability levels between the groups.

The primary effect measure was the mean difference in functional disability scores between the CFT and standard care groups. This measure captured the extent to which CFT reduced disability as reflected by changes in RMDQ and ODI scores. The consistent use of validated tools across studies ensured similar and comparable assessments of functional outcomes.

Data Analysis

Participant demographic data were summarized using descriptive statistics, presented as mean (SD), median (IQR), or counts (percentages) as appropriate. The primary continuous variable's unadjusted mean (SD) values were calculated at baseline and follow-up points, including three, six, and 12 months. A positive mean difference across all six studies indicated improved outcomes for participants receiving cognitive functional therapy (CFT) compared to standard care. The effect sizes were categorized as small (0.2), moderate (0.5), and large (0.8) based on widely accepted benchmarks. Heterogeneity among studies was measured using the I^2 statistic, which represents the proportion of total variability in the results that arises from differences between studies rather than random chance. I^2 values below 25% indicated low heterogeneity, 25–50% represented

moderate heterogeneity, and values above 50% suggested substantial heterogeneity. A random-effects model was chosen to account for variability both within and between studies, given the differences in populations, interventions, and outcomes across the included trials. Subgroup analyses and specific comparisons, such as those involving the Roland Morris Disability Questionnaire (RMDQ), used mean differences for outcome evaluation. Standardized mean differences (SMD) were applied in broader analyses to compare outcomes measured with different tools across studies. All statistical analyses were conducted using R software, which facilitated the calculation of effect sizes, pooled estimates, and the creation of forest and funnel plots. This approach ensured a comprehensive and reliable assessment of the effectiveness of cognitive functional therapy (CFT) in reducing functional disability compared to standard care.

Results

Selection of studies

A total of 178 records were screened, out of which 168 were excluded based on the title and abstract not meeting the inclusion criteria. The remaining 12 reports were retrieved and assessed for full-text eligibility. During this stage, six reports were excluded for the following reasons: two studies were excluded for not following standard guidelines of cognitive functional therapy (Reason 1), two for not reporting outcomes related to functional disability (Reason 2), and two for not adhering to randomized controlled trial (RCT) designs (Reason 3). Ultimately, six studies met the inclusion criteria and were included in the meta-analysis. These six studies provided sufficient data to evaluate the effectiveness of cognitive functional therapy (CFT) compared to standard care in reducing functional disability among adults with chronic low back pain. A PRISMA flow diagram summarizing the study selection process is presented below in Figure 1, illustrating the progression from the initial records screened to the final studies included in the analysis.

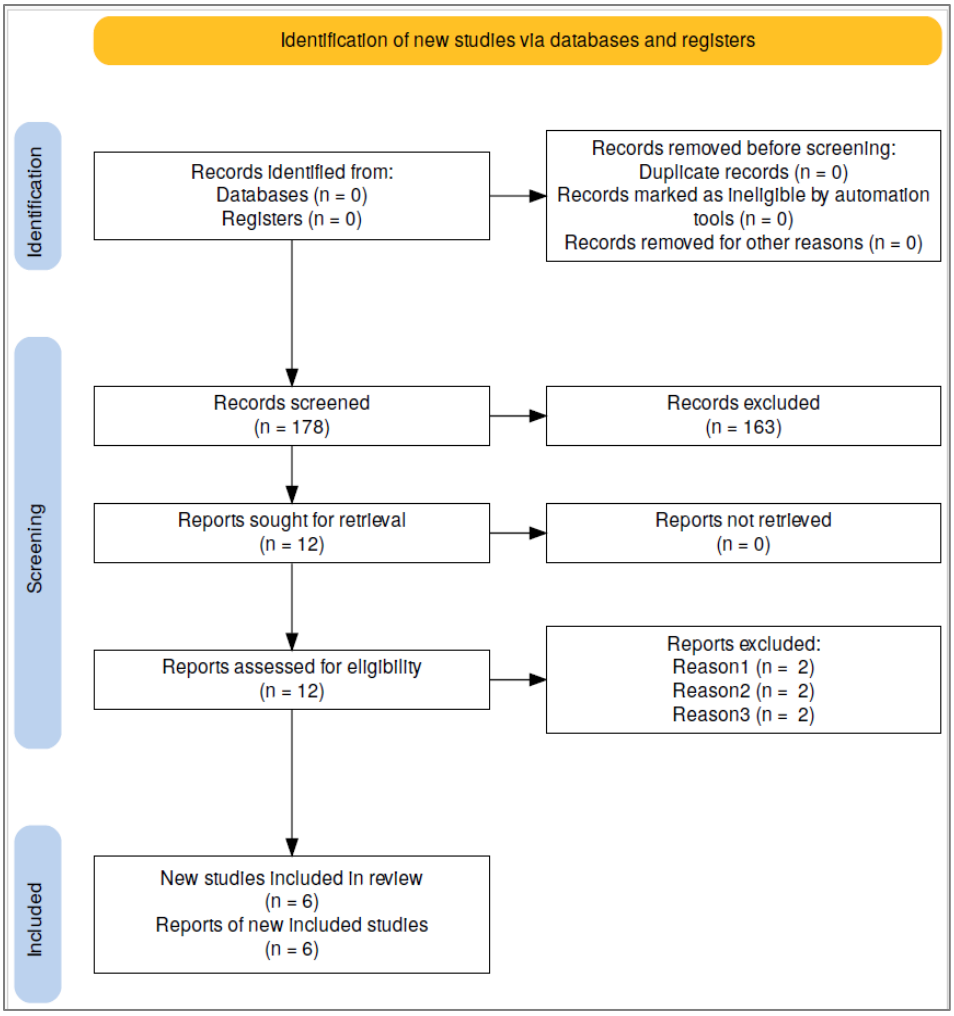

Fig. 1. Flow Diagram based on PRISMA statement

Characteristics of included studies

This meta-analysis includes six studies with a total of 651 participants (326 in the intervention group and 325 in the control group) investigating the effectiveness of Cognitive Functional Therapy (CFT) in managing chronic low back pain (CLBP). These studies were conducted in various countries, including the United Kingdom, Australia, Ireland, Norway, and Brazil, providing a geographically diverse dataset. Participants were adults, ranging in mean age from 18.5 to 46.5 years, and included both male and female individuals, with some studies reporting a

predominantly female cohort. The primary outcome across all studies was the reduction of functional disability, measured using validated tools such as the Roland-Morris Disability Questionnaire (RMDQ) and the Oswestry Disability Index (ODI). Secondary outcomes assessed pain intensity through the Numeric Pain Rating Scale (NPRS). The intervention involved face-to-face CFT sessions delivered over a duration of 4 to 12 weeks, with session frequencies ranging from 8 to 12 meetings and session lengths of 30 to 60 minutes. Control groups received standard care or usual therapy. Dropout rates varied, with losses ranging from 1/2 in the smallest study to 34/32 in the largest. Despite these dropouts, all studies reported complete data for most participants in the final analysis. Importantly, no adverse or serious adverse events were noted across the studies. The effect measure for comparing outcomes was the standardized mean difference (SMD), which allowed for consistency in analyzing the intervention's impact on reducing disability and pain. These results collectively highlight the potential of CFT as a safe and effective intervention for managing CLBP in diverse populations. Further details are shown in Table 1.

Primary-Analysis

The primary analysis evaluated the effectiveness of Cognitive Functional Therapy (CFT) in reducing functional disability among adults with chronic low back pain, integrating data from six randomized controlled trials (RCTs). Functional disability was measured using two validated tools: the Roland-Morris Disability Questionnaire (RMDQ) and the Oswestry Disability Index (ODI). To account for differences in measurement scales across studies, the results were analyzed using the Standardized Mean Difference (SMD).

Study (Year)	Country	Total Participants (Intervention /Control)	Final Analysis (Intervention /Control)	Mean Age (Yrs)	Primary Outcome	Secondary Outcome	Inter-vention	Intervention Duration & Frequency	Control Group	Dropouts (Intervention /Control)	Adverse Events
Newton et al. (2024)	United Kingdom	60 (30/30)	32 (16/16)	46.5	RMDQ (Functional Disability)	NPRS (Pain Intensity)	CFT	3 months, 10 sessions (1 hr + 30 mins)	Standard care	14/14	None
Leo et al. (2015)	Australia.	36 (19/17)	33 (18/15)	18.5	RMDQ (Functional Disability)	NPRS (Pain Intensity)	CFT	12 weeks, 10 sessions (1 hr + 30 mins)	Not recorded	1/2	None
Mary et al. (2020)	Ireland	206 (106/100)	140(72/68)	46.5	ODI (Functional Disability)	NPRS (Pain Intensity)	CFT	3 months, 10 sessions (1 hr + 30 mins)	Other treatment or none	34/32	None
Kjartan et al. (2019)	Norway	121 (62/59)	87 (46/41)	40	ODI (Functional Disability)	NPRS (Pain Intensity)	CFT	12 weeks, 10 sessions (1 hr + 30-45 mins)	Manual therapy	29/26	None
Julia et al. (2022)	Brazil	148 (74/74)	137(71/66)	46.5	ODI (Functional Disability)	NPRS (Pain Intensity)	CFT	8 weeks, 8 sessions (1 hr weekly)	Core manual therapy	3/8	None
Leonardo et al. (2024)	Brazil	80 (40/40)	74 (38/36)	46.5	ODI (Functional Disability)	NPRS (Pain Intensity)	CFT	4-12 weeks, 4-12 sessions (1 hr weekly)	Core manual therapy	2/4	None

Table 1: Study characteristics

Summary Data

Figure 2 shows the pooled SMD from the random-effects model is -0.56 (95% CI: -0.95 to -0.17), which corresponds to a moderate effect size. This indicates that the intervention group (CFT) demonstrated significantly lower levels of functional disability compared to the control group (standard care). The 95% confidence interval does not cross zero, confirming the statistical

significance of the findings. The use of a random-effects model is particularly important in this meta-analysis because it accounts for potential variability in study populations, interventions, and measurement methods across the six trials. The moderate effect size suggests that CFT has a clinically meaningful impact on reducing functional disability, supporting its effectiveness as a therapeutic intervention. These results highlight the consistent benefits of CFT across diverse settings and study designs, as included in the meta-analysis.

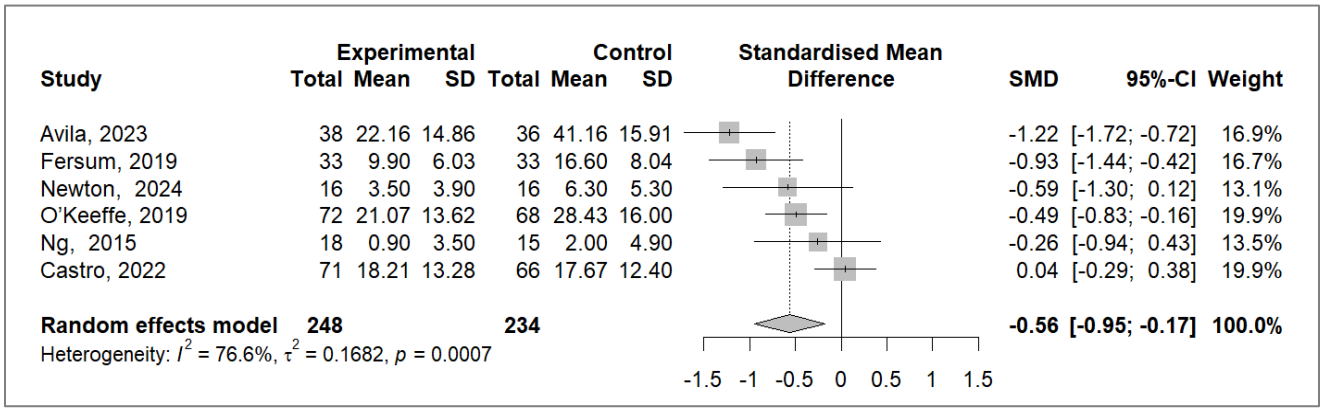

Fig. 2. Main result: Forest Plot

Subgroup Analysis

To further investigate the effectiveness of Cognitive Functional Therapy (CFT), subgroup analysis illustrated in Figure 3 was conducted based on the measurement tools used to assess functional disability: the Roland-Morris Disability Questionnaire (RMDQ) and the Oswestry Disability Index (ODI).

For the RMDQ, the pooled SMD for studies using this tool is -0.42 (95% CI: -0.91 to 0.08), indicating a small, non-significant effect size. This suggests that while there is a trend toward reduced functional disability in the CFT group compared to the control group, the effect does not

reach statistical significance. Notably, the heterogeneity for this subgroup is $I^2 = 0\%$, indicating high consistency across the included studies using this tool.

In contrast, for the ODI, the pooled SMD for studies using this tool is -0.63 (95% CI: -1.17 to -0.08), representing a significant effect size. This finding indicates that CFT significantly reduces functional disability compared to standard care when measured by the ODI. However, the heterogeneity is $I^2 = 85.6\%$, highlighting substantial variability among the studies.

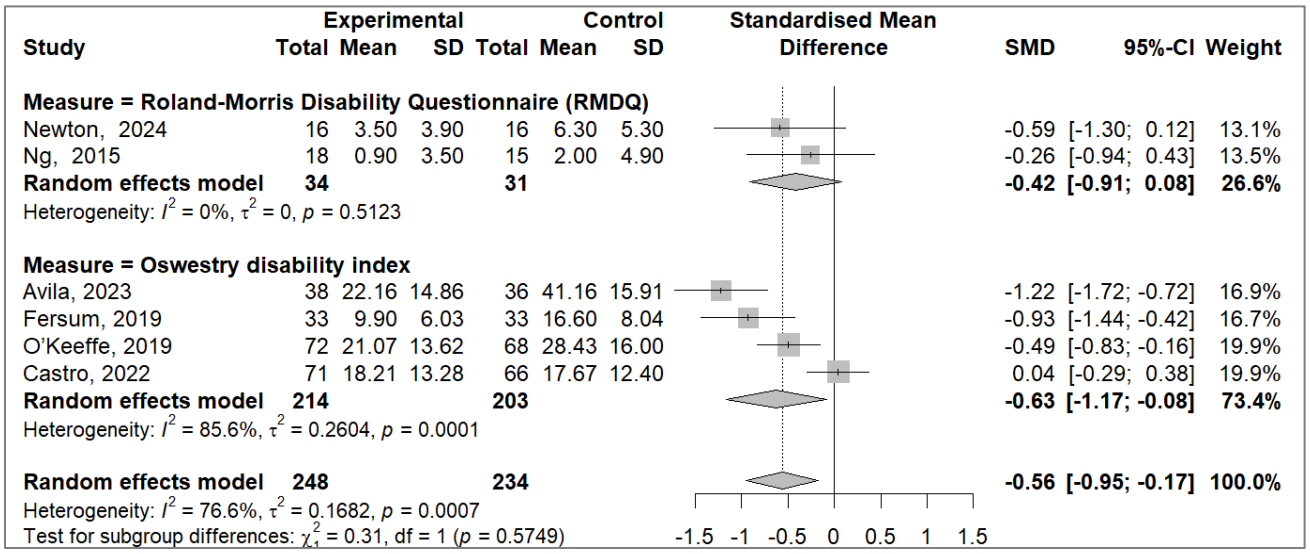

Fig. 3. Subgroup Analysis: Forest Plot

Mean Difference for Studies using ODI Questionnaire

In addition to the SMD analysis, studies using the ODI were further examined using the Mean Difference (MD) for functional disability scores demonstrated in Figure 4. The pooled MD is -7.78 points (95% CI: -15.33 to -0.23), indicating a statistically significant improvement in functional disability for participants in the CFT group compared to those receiving standard care. The reduction of 7.78 points in the ODI score is considered clinically meaningful because it exceeds the minimal clinically important difference (MCID) reported in the literatures[17-18]. For

instance, Suarez-Almazor et al.[18] identified an MCID of only 5.2 points for the Oswestry Disability Index, supporting the clinical significance of this reduction.

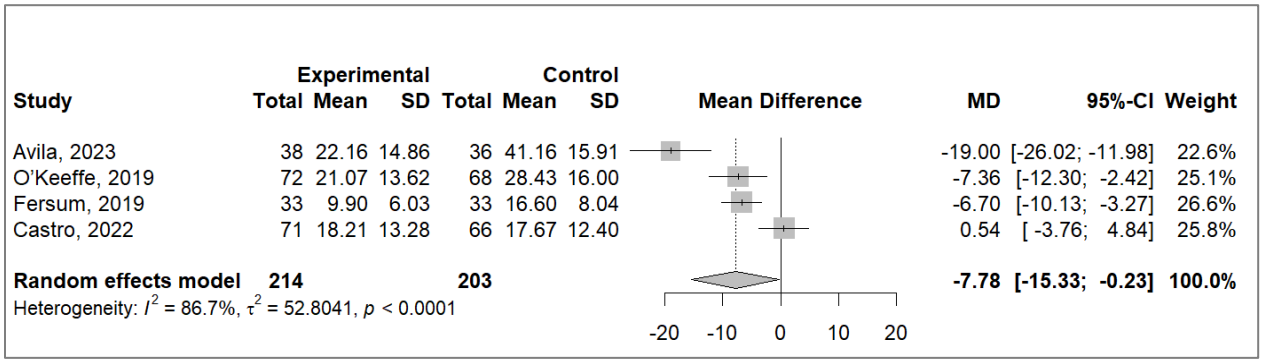

Fig. 4. Mean Difference for ODI: Forest Plot

Heterogeneity

Heterogeneity across the six included studies was assessed using the I^2 statistic, which quantifies the proportion of variability attributable to differences between studies rather than random chance. The overall heterogeneity for the primary analysis was $I^2 = 76.6\%$, suggesting substantial variation among studies. This indicates that differences in study populations, intervention protocols, or outcome assessments may contribute to the observed variability. Subgroup analyses revealed distinct patterns. Studies using the Roland-Morris Disability Questionnaire (RMDQ) showed no heterogeneity ($I^2 = 0\%$), indicating consistent findings. However, studies using the Oswestry Disability Index (ODI) showed high heterogeneity ($I^2 = 85.6\%$), reflecting significant differences in outcomes. This variability could be attributed to factors such as participant characteristics. For example, in the studies by Kjartan et al.[10] and Mary et al.[12], the participants included both males and females, whereas in the studies by Leonardo et al.[11] and Julia et al.[9], the participants were predominantly female. Although standard CFT guidelines were followed for consistency across all the studies, physiotherapists from different geographical locations might

have differed in their techniques[9-14]. Moreover, patient-reported outcome measures (PROMs) might have contributed to variations in interpretation and errors across studies[9-14]. Overall, these findings suggest that while CFT has a moderate effect on functional disability, the degree of variability across studies should be considered when interpreting the results.

Assessment of Publication Bias

Publication bias was evaluated using a funnel plot as shown in Figure 5, which visually examines the relationship between study precision (measured by standard error) and effect size. The funnel plot demonstrated a generally symmetrical distribution of studies, suggesting no significant evidence of publication bias. Studies with greater precision and larger sample sizes were clustered near the top of the funnel, while those with lower precision and smaller sample sizes were spread towards the bottom.

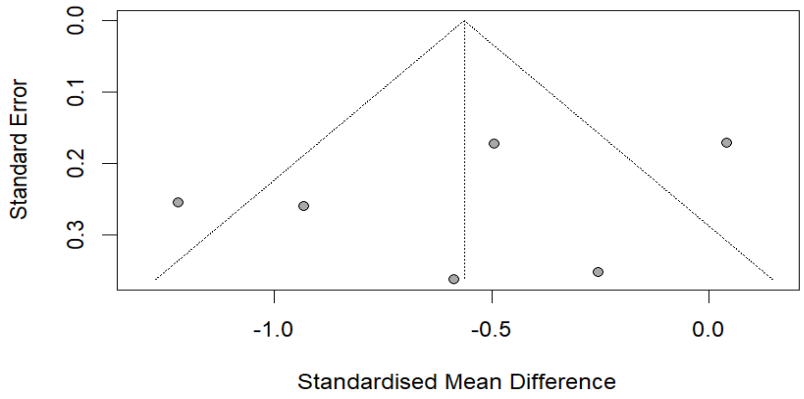

Fig. 5. Publication Bias Assessment: Funnel Plot

Discussion

Individuals living with chronic low back pain (CLBP) suffer both economically and physically due to the substantial costs of care required to manage the condition, as well as significant workdays lost annually[2]. Despite the availability of numerous treatment options for CLBP, this

disorder remains resistant to treatment, with no single approach providing consistently superior[15]. Recently, several studies have suggested that Cognitive Functional Therapy (CFT) may be more effective than standard care in managing CLBP[6–15]. Accordingly, the purpose of this meta-analysis is to compare the effectiveness of CFT in reducing functional disability with standard care among adults with CLBP.

After an initial screening of 178 studies and a thorough examination, this meta-analysis ultimately included six randomized controlled trials (RCTs) involving a total of 651 participants. Funnel plot analysis was used to assess publication bias and concluded that the meta-analysis is free from such bias (Fig.5). The results demonstrated a moderate and statistically significant effect size, with a pooled standardized mean difference (SMD) of -0.56 (95% CI: -0.95 to -0.17). Subgroup analysis revealed variability depending on the measurement tool used: studies using the Oswestry Disability Index (ODI) showed a significant effect with higher heterogeneity ($I^2 = 85.6\%$), while those using the Roland-Morris Disability Questionnaire (RMDQ) indicated a small, non-significant effect with no heterogeneity ($I^2 = 0\%$). According to a systematic review and meta-analysis, there is no strong evidence to prefer one measurement tool over the other when assessing physical functioning in patients with non-specific low back pain (NSLBP)[15]. Both the RMDQ and the ODI are valid and widely used, offering comparable utility for evaluating functional outcomes[15].

This meta-analysis aligns with previous randomized trials emphasizing the effectiveness of CFT in managing functional disability in CLBP[6–15]. Furthermore, it provides additional specificity by quantifying the effect size of CFT and identifying differences based on measurement tools. By including only RCTs, this analysis minimized the risk of selection bias and ensured robust evidence. The use of a random-effects model accounted for variability across studies, offering a

comprehensive understanding of CFT's effectiveness across diverse populations. Subgroup analyses provided deeper insights into the influence of measurement tools and study-specific factors.

However, several limitations should be considered when interpreting these results and addressed in future research. High heterogeneity ($I^2 = 76.6\%$) in the overall analysis suggests substantial variability between studies, which may affect the generalizability of the findings. This heterogeneity likely stems from differences in study populations, intervention intensities, follow-up durations, and baseline characteristics. Imprecision in some estimates, such as the wide confidence intervals for RMDQ outcomes, also limits the interpretability of these findings.

A key controversy raised by this study is the inconsistent effectiveness of CFT depending on the measurement tool used. While the ODI consistently indicated significant improvements, the RMDQ demonstrated small, non-significant effects. This discrepancy may reflect differences in the sensitivity and scope of the two instruments, raising questions about which tool is more suitable for assessing functional disability in CLBP. Notably, prior research has asserted that the RMDQ and ODI cannot be used interchangeably, nor can their scores be converted to report outcomes consistently[16]. Moreover, the high heterogeneity observed in studies using the ODI suggests that these results may be context-dependent, influenced by variations in study design, sample demographics, and intervention protocols.

To address these limitations and controversies, future research should focus on conducting large-scale RCTs with standardized intervention protocols and consistent follow-up periods to reduce variability and improve comparability across studies. Evaluating the relative sensitivity of the RMDQ and ODI is essential to determine the most appropriate tool for assessing functional

disability in CLBP patients. Additionally, exploring the long-term effectiveness of CFT by extending follow-up periods beyond the 12 weeks observed in most studies would provide valuable insights into its sustained benefits. Investigating potential moderators of treatment effectiveness, such as patient demographics, baseline disability levels, and psychological factors, is also critical for understanding which subgroups may benefit most from CFT. Finally, including diverse populations, particularly from low-income and underserved communities, is necessary to improve the generalizability of findings and address health equity in CLBP management.

These findings underscore the importance of incorporating CFT into clinical guidelines for managing CLBP, particularly for patients with moderate to severe functional disability. The statistically significant reduction in disability scores suggests that CFT could offer meaningful improvements in quality of life. From a public health perspective, widespread adoption of CFT could reduce the socioeconomic burden associated with CLBP, including healthcare costs and loss of productivity. Policymakers should consider supporting training programs for healthcare providers to implement CFT and promoting access to multidisciplinary treatment options for patients with CLBP.

Conclusion

This meta-analysis provides evidence supporting Cognitive Functional Therapy (CFT) as an effective treatment compared to standard care for reducing functional disability in adults with chronic low back pain (CLBP). The analysis shows a moderate, statistically significant improvement in functional outcomes with CFT compared to standard care, suggesting it may be a valuable treatment option for patients suffering from moderate to severe disability. However, the

presence of heterogeneity across studies and the variability in the measurement tools used highlight the need for careful interpretation of these findings.

Future research should focus on addressing these limitations by conducting well-designed, large-scale randomized controlled trials (RCTs) that standardize intervention protocols and follow-up periods. Further investigation is also needed to determine the most effective measurement tools for assessing functional disability in CLBP patients, as well as to explore the long-term effects of CFT on patient outcomes. Additionally, exploring long-term outcomes of CFT and identifying factors that influence its effectiveness in diverse patient populations will provide valuable insights to optimize its clinical use.

From a public health perspective, integrating CFT into clinical practice could lead to significant reductions in the social and economic burden of CLBP. By improving patient outcomes, including functional ability and quality of life, CFT could help lower healthcare costs and reduce work-related disability. Collaborative efforts among policymakers, healthcare providers, and public health professionals will be critical to advancing the implementation and accessibility of CFT in CLBP.

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