Cognitive-behavioral Treatment for Subacute and Chronic Neck Pain

Marco Monticone , MD, PhD,* Emilia Ambrosini , PhD,*† Christine Cedraschi , Psy, PhD,‡ Barbara Rocca , Psy,* Roberta Fiorentini , PT,* Maddalena Restelli , PT,* Silvia Gianola , PT ,§ Simona Ferrante , PhD,¶ Gustavo Zanoli , MD, PhD ,‖ and Lorenzo Moja , MD, PhD**

Neck pain (NP) is experienced by people of all ages and both sexes.[1] 1-year prevalence of persistent symptoms range from 1.7% to 11.5% in the general population, being responsible for most of the social and economic costs of this condition.[2]

NP is multifactorial in its aetiology [3,4] and factors contributing to its development include age, sex, history of NP, the occurrence of other musculoskeletal problems, poor posture, repetitive strain, poor self-rated health, and social and psychological factors.[3,4] Research links persistent NP to psychological factors, including cognitive distress, anxiety, and depressed mood.[5] These factors may play a role in the chronicity of symptoms and may contribute to a downward spiral of increasing avoidance, disability, and pain.[6,7]

From the *Physical Medicine and Rehabilitation Unit, Scientifi c Institute of Lissone (Milan), Institute of Care and Research, Salvatore Maugeri Foundation, IRCCS, ~~Milan~~, Italy; †Neuroengineering and Medical Robotics Laboratory, Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milan, Italy; ‡Multidisciplinary Pain Centre, Division of Clinical Pharmacology and Toxicology & Division of General Medical Rehabilitation, Geneva University Hospitals, Geneva, Switzerland; §Clinical Epidemiology Unit, IRCCS Galeazzi Orthopaedic Institute, Milan, Italy; ¶Neuroengineering and Medical Robotics Laboratory, Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milan, Italy; ‖Casa di Cura SM Maddalena, University of Ferrara, Occhiobello (RO), Ferrara, Italy; and **Department of Biomedical Sciences for Health, University of Milan, Milan, Italy and Clinical Epidemiology Unit, IRCCS Galeazzi Orthopaedic Institute, Milan, Italy.

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Address correspondence and reprint requests to Marco Monticone, MD, PhD, Physical Medicine and Rehabilitation Unit, Scientifi c Institute of Lissone, Salvatore Maugeri Foundation, Institute of Care and Research (IRCCS), Via Monsignor Bernasconi, 16, 20851 Lissone, Monza Brianza, Italy; E-mail: marco.monticone@fsm.it

Cognitive-behavioral treatment (CBT) is a psychological management strategy that may be useful for subacute and chronic NP presented by treating the associated psychological and behavioral factors as described above, alone or in conjunction with other therapeutic modalities (*e.g.*, exercise, physical modalities). CBT encompasses a wide set of interventions conducted by health professionals that include cognitive reconditioning (*e.g.*, cognitive restructuring, imagery, attention diversion, relaxation techniques) and behavioral modifi cations of specifi c activities (*e.g.*, operant treatment, pacing, graded exposure approaches) to modify and/or reduce the impact of pain and physical and psychosocial disability and to overcome barriers to physical and psychosocial recovery.[8–12] CBT works by modifying maladaptive and dysfunctional thoughts (*e.g.*, catastrophising, kinesiophobia) and improving mood (*e.g.*, anxiety and depression), leading to gradual changes in maladapted cognitions and illness behaviours. Participants are assisted in transferring attention from erratic thoughts and fears to adaptive thought patterns, increasing the level of activity by means of pacing and graded exposure to situations they had previously avoided. Acquisition of adaptive coping strategies is promoted through communication between the health professionals and the patient, and the defi nition of realistic goals is provided.[8–12]

CBT is commonly used in the management of persistent low back pain.[13] However, it is still debated whether treating cognitive and behavioral factors in patients with subacute and chronic NP can lead to clinically meaningful changes in disability, dysfunctional thoughts, pain and quality of life.

Therefore, this review was undertaken to determine the effects of CBT among individuals with subacute and chronic NP. This article is adapted from a recent Cochrane review.[14]

MATERIAL AND METHODS

We included randomized-controlled trials (RCTs) recruiting adults with a clinical diagnosis of subacute (*i.e.*, a documented history of pain lasting for >1 mo and <3 mo) or chronic NP (*i.e.*, a documented history of pain lasting for >3 mo). The following comparisons were specifically investigated: CBT *versus* placebo, no treatment, or waiting list controls; CBT *versus* other types of interventions; CBT in addition to another intervention (*e.g.*, physiotherapy) *versus* the other intervention alone.

CBT encompasses a wide set of interventions, including cognitive reconditioning and behavioral modifications of specifi c activities to modify and/or reduce the impact of pain and physical and psychosocial disability.[8–12] Only trials that specifi ed the use of treatment based on cognitive-behavioral principles were considered eligible. Simple psychologically-oriented pain management strategies were not considered a true cognitive-behavioral treatment.

Outcome Measures

Pain, measured by a visual analogue scale (VAS) or a numerical rating scale (NRS), was chosen as primary outcome. As secondary outcomes we considered: disability (*e.g.*, Neck Disability Index); psychological indicators, such as fear of pain, kinesiophobia, catastrophising, coping strategies, anxiety, depression; global improvement or perceived recovery; quality of life (*e.g.*, Short-Form Health Survey Questionnaire); return to work; satisfaction with treatment (*e.g.*, Global Perceived Effect); adverse events; reduction in frequency or number of medications used. Trials must have reported on at least 1 of the above-mentioned outcomes. Outcomes measured closest to 4 weeks, 6 months, and 1 year were considered short-, intermediate-, and long-term follow-up, respectively.

Search Methods for Identification of Studies

We searched the following databases from inception to November, 2014: Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, PsycINFO, SCOPUS, Web of Science, PubMed, ClinicalTrials.gov, and World Health Organization International Clinical Trials Registry. The reference lists of all included studies and systematic reviews pertinent to this topic were also screened.

We used the search strategy recommended by the Cochrane Back Review Group.[15] The exact search strategy is available upon request from the primary author.

Selection of Studies

5 teams of 2 authors each (MM-CC; EA-LM; BR-RF; MR-SG; and SF-GZ) independently screened the search results by reading titles and abstracts. All potentially relevant articles were retrieved for full text assessment. If there was disagreement between authors, it was resolved through discussion. If consensus could not be reached, a third author (LM) was consulted.

Data Extraction and Management

2 authors (RF and MR) independently extracted information concerning methods, participants, interventions, and outcomes measures, using a customised data extraction form. Measures of effect were extracted in the form of follow-up (postintervention) measurements or change scores from baseline in all intervention and control groups.

Risk of Bias Assessment

2 review authors (EA and MM) independently assessed the risk of bias (RoB) of each included RCT using the 12 criteria recommended by the Cochrane Back Review Group.[15] For each study, each criterion was assessed as “low risk”, “high risk” or “unclear”. Studies were judged as having a “low” overall risk of bias when greater than equal to 6 criteria were met in the absence of other serious methodological weakness.

Measures of Treatment Effect

We considered separately the effects of CBT for populations with subacute and chronic NP.

Data were analyzed using Review Manager 5. We assessed the treatment effects using for dichotomized outcomes the risk ratio (RR), and for continuous outcomes the mean difference (MD) or the standardized mean difference (SMD), when the outcome was measured using different instruments, along with 95% confidence intervals. For dichotomous outcomes,

an RR less than 1 indicated that CBT resulted in greater improvement than the comparison therapy. For continuous outcomes, a negative effect size indicated that CBT was more beneficial than the comparison therapy.

The clinical relevance of each included trial was independently assessed by 2 review authors (MM and SG) using the 5 questions recommended by the Cochrane Back Review Group.[15] A clinically important treatment effect for the primary outcome was achieved if improvement of greater than equal to 2.5 points was seen on a 0 to 10 VAS/NRS scale; a 25% relative improvement was taken into account as a clinically important treatment effect for all secondary outcomes.[16–18]

Missing Data

Missing data were treated according to whether data were "missing at random" or "not missing at random." In relation to the former, we analyzed available data and ignored missing data. When standard deviations (SD) were not reported, we used imputation [15]: for each outcome SD was computed as the pooled SD from all other trials in the same meta-analysis by treatment group. When the proportion of trials missing variability data for a particular outcome was high (>20%), or when data were not missed at random, the analysis was conducted only on available data.

Assessment of Heterogeneity

Statistical heterogeneity was assessed using the I^2 statistic and the χ^2 test. For the meta-analysis, we used a fixed-effect model if trials were sufficiently homogeneous ($I^2 < 25\%$) and a random-effects model if trials presented moderate levels of heterogeneity ($25\% < I^2 < 75\%$). If considerable between-group statistical heterogeneity was detected ($I^2 > 75\%$), a meta-analysis was not performed.

Assessment of Reporting Biases

We checked for inconsistencies between the information presented in clinical trial registries and that provided in published reports of trials. We also planned to use funnel plots to explore the likelihood of reporting biases when at least 10 studies were included in the meta-analysis and studies were not of similar size. However, due to the small number of identified studies, this analysis was not performed.

Data Synthesis

The results from individual trials were combined when possible through a meta-analysis. This pooling of the data (if applicable) was dependent on the level of heterogeneity of retrieved studies.

Regardless of whether available homogeneous data were pooled in a meta-analysis, the overall quality of the evidence was assessed for each outcome using the GRADE approach (GRADEpro. Version on www.gradepro.org. McMaster University, 2014). The quality of the evidence was based on 5 factors: study design and limitations, consistency of results, directness (generalizability), precision (sufficient data), and reporting of results across all studies that measured that particular outcome. The quality starts at "high" when high-quality RCTs provide results for the outcome and is reduced by 1 level for each of the factors not met.

"Summary of findings" tables were created for pain, disability, and kinesiophobia. 2 separate tables were prepared, 1 for subacute and 1 for chronic NP, each of them reported the results of the most important comparison, selected on the basis of the number of studies and on the time point of the follow-up (the longer the follow-up, the more preferred the comparison).

RESULTS

From 4193 articles identified by the search strategy, 10 RCTs (from 14 reports) were included in this review,[19–28] as shown in Figure 1.

Characteristics of Included Studies

In total, 337 subjects with subacute NP were examined in 2 studies,[23,24] whereas 499 participants with chronic NP were included in the remaining 8 studies.

4 studies (225 subjects) [19,24,26,28] compared some type of CBT with no treatment. The experimental interventions consisted of an individually trauma-focused CBT based on the Australian Guidelines for the treatment of Acute Stress Disorder and Posttraumatic Stress Disorder [19]; an educational booklet plus skill training and pacing and graded exposure therapy in one-on-one format [24]; cervicothoracic stabilization,

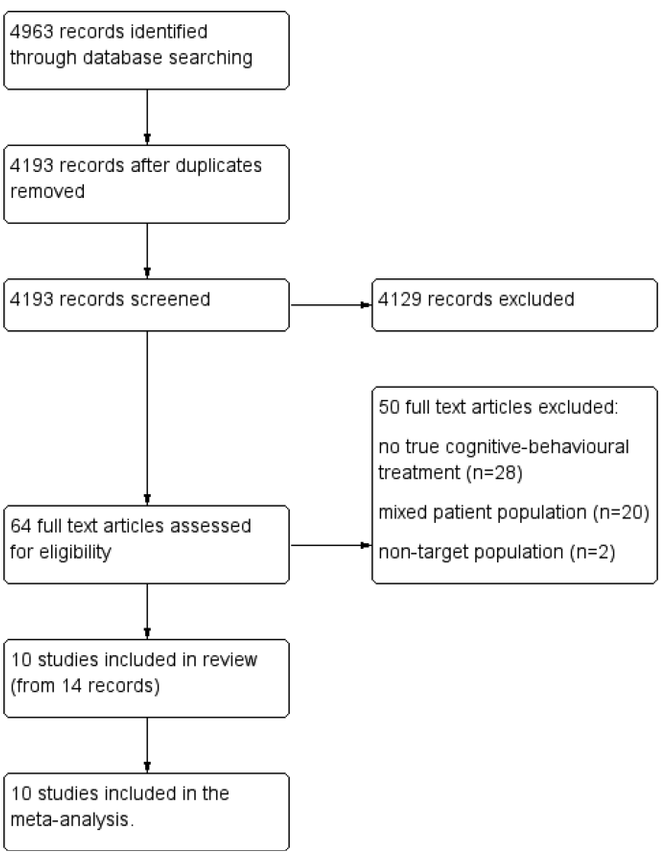

Figure 1. Study flow diagram.

relaxation training, behavioral support, eye fixation exercises and seated wobble-board training,[26] and an individual training aimed at increasing psychological fl exibility by means of pain education, values assessment, shifting perspective, exposure, acceptance and diffusion.[28]

5 studies (506 subjects) [20,23,24,26,27] compared CBT with other types of treatment. CBT consisted of applied relaxation training, coping strategies, body awareness exercises and theoretical information about anatomy, aetiology, physiology, and management of pain and stress [20]; a behavioral graded program, focused on decrease in pain behaviour, increase in "healthy" behaviour, and improvement of function, with no attention to pain reduction [23]; and a behaviour graded activity, including pain and pain-related beliefs management, pacing and graded exposure to exercises.[27]

Finally, 3 studies (200 subjects) [21, 22, 25] compared CBT addition to another treatment with that treatment alone. The experimental programs consisted of exercises and CBT based on correct relearning and cognitive reconditioning, physical, and psychosocial recovery to modify mistaken fears, catastrophising beliefs, and inappropriate thinking [21]; a training focused on pain aspects, teaching control of pain, stress reduction, and chronic pain management techniques [22]; and the learning of basic physical and psychological skills, the application and generalization of these basic skills in everyday activities and the maintenance of these skills.[25]

2 studies [24, 26] were included in 2 comparisons because they randomized the participants into 3 groups: an experimental group, receiving CBT; a no-treated group, receiving only an information booklet; and a control group receiving some other type of intervention.

In only 4 studies,[19, 22, 24, 28] CBT was delivered by a clinic psychologist.

Risk of Bias

Figure 2 shows the results of the RoB assessment. 4 studies achieved an overall low risk of bias.[20, 21, 23, 27] All studies we described as randomized, but in only 3 studies both the sequence generation and the allocation procedure were properly conducted. 8 studies had similar timing of outcome measurements between groups and 7 studies were free of selective reporting. 7 studies had an acceptable drop-out rate, 4 studies reported acceptable compliance, and in only 2 studies cointerventions were avoided or similar between groups. In most of the studies (90%), groups were similar at baseline, and in 6 studies an intention-to-treat analysis was performed. In all studies, blinding of participants, assessors, and care providers was inadequate.

Clinical Relevance

The included studies had a moderate to high clinical relevance: they could be easily assessed in terms of applicability to other populations (100%), provided suffi cient descriptions of the interventions applied (90%), measured appropriate outcome measures (100%), and treatment benefits outweighed the potential harms (100%). However, in no studies the size of the effect reached a clinically important difference.

Effects of Interventions

The main findings of this review are summarized in Tables 1 and 2.

CBT *Versus* Other Treatments on Subacute NP

2 studies, 1 with high [24] and 1 with low risk of bias,[23] evaluated the effects of CBT on patients with subacute NP (Table 2). Data from a total of 265 participants were suitable for pooled analysis (Figure 3) and showed, with low-quality evidence, that CBT was better than other interventions for improving pain (SMD −0.24, 95% CI −0.48 to 0.00; Figure 3) at short-term follow-up, whereas no effect was found on disability (SMD −0.12, 95% CI −0.36 to 0.12).

1 of the 2 studies [23] evaluated also the effect at long-term follow-up and observed that CBT was better than manual therapy at improving pain and disability, whereas for psychological indicators no significant between-group difference was found.

CBT *Versus* No Treatment on Chronic NP

Low-quality evidence from 3 RCTs with high risk of bias [19,26,28] (89 participants with chronic NP) indicated that CBT was more effective than no treatment for pain relief in the short-term (SMD −0.58, 95% CI −1.01 to −0.16; Figure 4). The outcome was downgraded from high to low quality due

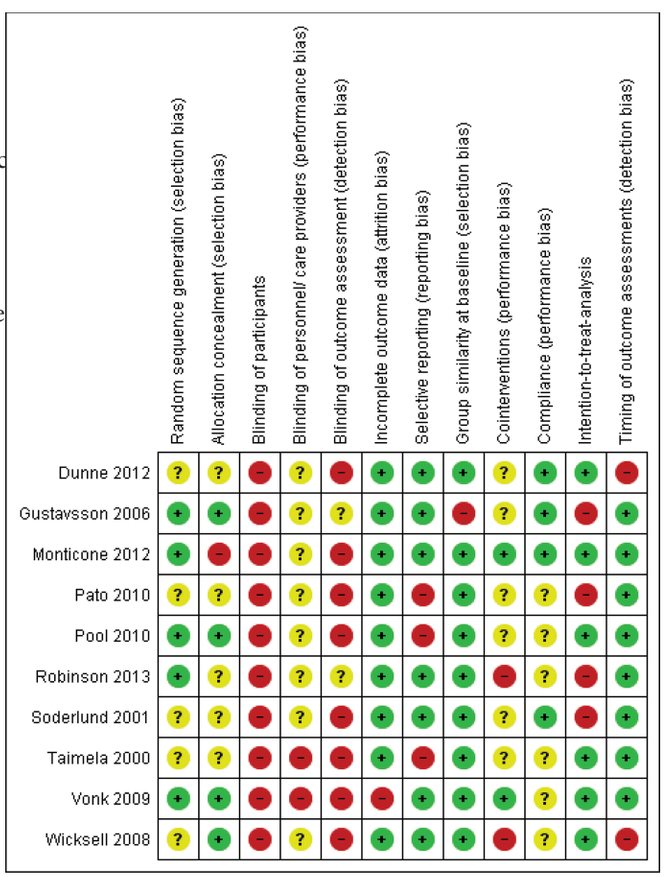

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

TABLE 1. Summary of Findings Table: CBT Compared With Other Types of Treatment for Chronic Neck Pain at Intermediate Follow-up

Patient or Population: chronic neck pain
Settings: primary and secondary healthcare centres
Intervention: cognitive-behavioural treatment
Comparison: other types of treatment

Outcomes	Illustrative comparative risks (95% CI)		No. of Participants (Studies)	Quality of the Evidence (GRADE)	Comments
	Assumed Risk	Corresponding Risk			
	Other Types of Treatment	Cognitive-Behavioural Treatment			
Pain: Numerical Rating Scale, from 0 (no pain) to 10 (maximum pain)	The mean pain ranged across control groups from 4.3 to 7.0 points.	The mean pain in the CBT group was 0.89 lower (2.73 lower to 0.94 higher).	168 (2 studies)	⊕⊕⊖⊖ low[*,‡]	We found an absence of evidence for a difference in pain.
Disability: Neck Disability Index, from 0 (no disability) to 100 (maximal disability)	*The intermediate follow-up for the most representative study (27) was 26.5 (SD 13.9).	The estimated mean disability in the CBT group was 3.35 lower (7.53 lower to 0.98 higher).	168 (2 studies)	⊕⊕⊖⊖ moderate[*]	No effect was found.
Kinesiophobia: Tampa Scale for Kinesiophobia, from 17 (no fear) to 68 (maximal fear)	*The intermediate follow-up for the most representative study (27) was 34.3 (SD 8.3).	The estimated mean kinesiophobia in the CBT group was 3.26 lower (5.76 to 0.67 lower).	168 (2 studies)	⊕⊕⊕⊖ moderate[*]	The effect was not clinically relevant. A 12-point of improvement (about 25%) is considered as a clinically important treatment effect for all secondary outcomes.

*Of the included trials for this outcome, we chose the study that is a combination of the most representative study population and has the largest weighting in the overall result in Revman (27). The reported data represent the intermediate follow-up mean in the control group of this study. **CI:** Confidence interval.

GRADE Working Group grades of evidence. **High quality:** Further research is very unlikely to change our confidence in the estimate of effect. **Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. **Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. **Very low quality:** We are very uncertain about the estimate.

[*] *Denotes serious imprecision (i.e., total number of participants <200 for each outcome; an optimal information size of 300 was computed considering an α of 0.05, a β of 0.2, and an effect size of 0.3 standard deviations).*

[‡] *Denotes unexplained heterogeneity (I^2= 72%).*

to serious imprecision and serious limitation in the design and implementation.

2 of these RCTs (46 participants) evaluated also disability and psychological indicators at short-term follow-up: there was low quality evidence that CBT had a significant positive benefit for disability (SMD −0.61, 95% CI −1.21 to −0.01; Figure 4) and quality of life (SMD −0.93, 95% CI −1.54 to −0.31), whereas no effect was found on kinesiophobia (MD −6.69, 95% CI −13.91 to 0.53) and distress (SMD −0.41, 95% CI −0.99 to 0.18).

CBT *Versus* other Treatments on Chronic NP

3 RCTs (212 participants), 2 with low [20,27] and 1 [26] with high risk of bias compared CBT with other interventions on subjects with chronic NP (Figure 5). For pain at short-term follow-up, there was low quality evidence (serious imprecision; risk of bias) that CBT did not differ in effectiveness from other interventions (SMD −0.06, 95% CI −0.33 to 0.21). 2 studies (168 participants) showed a similar result on pain at intermediate-term follow-up (MD −0.89, 95% CI −2.73 to 0.94) and evaluated the effects also on secondary outcome measures. Concerning disability, there was moderate quality evidence (serious imprecision) of no difference between the effectiveness of CBT and other interventions both at short-term (SMD −0.10, 95% CI −0.40 to 0.20) and intermediate-term follow-up (SMD −0.24, 95% CI −0.54 to 0.07), whereas an effect in favour of CBT was found on kinesiophobia at intermediate-term follow-up (SMD −0.39, 95% CI −0.69 to −0.08) and on depression at short-term follow-up (SMD −0.43, 95% CI −0.74 to −0.12). The benefit on

TABLE 2. Summary of Findings Table: CBT Compared With Other Types of Treatment for Subacute Neck Pain at Short-term Follow-up

Patient or Population: subacute neck pain
Settings: primary and secondary healthcare centres
Intervention: cognitive-behavioral treatment
Comparison: other types of treatment

Outcomes	Illustrative Comparative Risks (95% CI)		No of Participants (Studies)	Quality of the Evidence (GRADE)	Comments
	Assumed Risk	Corresponding Risk			
	Other Types of Treatment	Cognitive-Behavioral Treatment			
Pain: Numerical Rating Scale, from 0 (no pain) to 10 (maximum pain)	*The short-term follow-up for the most representative study (23) was 2.15 (SD 2.57).	The estimated mean pain in the CBT group was 0.62 lower (1.23 lower to 0.00).	265 (2 studies)	⊕⊕⊖⊖ low*‡	The effect was not clinically relevant. A clinically important effect on 0–10 scale is about 2.5 points.
Disability: Neck Disability Index, from 0 (no disability) to 50 (maximal disability)	*The short-term follow-up for the most representative study (23) was 6.28 (SD 5.79).	The estimated mean disability in the CBT group was 0.69 lower (2.08 lower to 0.69 higher).	265 (2 study)	⊕⊕⊖⊖ low*‡	No effect was found.
Kinesiophobia: various scales	*The most representative study (23) did not report the short-term follow-up. The other study (24) reported a short-term follow-up of 105.7 (139.2) in terms of Fear of Specific Neck Movements, from 0 (no fear) to 720 (max fear).	No difference was found individually by the 2 studies. A meta-analysis was not conducted because 1 study (23) did not report individual data.	265 (2 studies)	⊕⊕⊖⊖ low*‡	No effect was found.

*Of the included trials for this outcome, we chose the study with low risk of bias (23). The reported data represent the intermediate follow-up mean in the control group of this study. **CI:** Confidence interval.

GRADE Working Group grades of evidence. **High quality:** Further research is very unlikely to change our confidence in the estimate of effect. **Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. **Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. **Very low quality:** We are very uncertain about the estimate.

*‡ *Denotes serious imprecision (i.e., total number of participants <300 for each outcome; an optimal information size of 300 was computed considering an α of 0.05, a β of 0.2, and an effect size of 0.3 standard deviations).*

‡ *Denotes serious limitation in the design and implementation because the estimates of the treatment effects were derived from 2 studies, 1 with high (24)and 1 with low risk of bias (23). The study (24) was considered as high risk of bias because it satisfied less than 6 criteria, as outlined in the Methods section.*

depression was lost at intermediate-term follow-up (SMD −0.29, 95% −0.60 to 0.01).

CBT in Addition to Another Treatment *Versus* the Same Treatment Alone on Chronic NP

Very low-quality evidence from 3 RCTs (185 participants), 1 with low [21] and 2 with high [22, 25] risk of bias indicated that CBT in addition to another intervention did not differ from the other intervention alone on subjects with chronic NP in terms of pain relief (SMD −0.36, 95% CI −0.73 to 0.02) and disability (SMD −0.10, 95% CI −0.56 to 0.36), as shown in Figure 6. Effects were evaluated at short-term and both outcomes were downgraded to very low quality due to serious imprecision, risk of bias, and unexplained heterogeneity.

DISCUSSION

Overall we found 10 randomized controlled trials. 2 studies evaluated the effects of CBT on subacute NP: these studies showed it was significantly better than other interventions for short-term pain relief, but this effect could not be considered as clinically relevant; furthermore, we found an absence of evidence for a difference in disability and kinesiophobia. With regard to chronic NP, CBT was found to be statistically significantly more effective than no treatment for short-term pain relief, decreasing disability, and improving quality of life, but these effects could not be considered clinically meaningful. The difference between CBT and other interventions were consistently limited and never statistically significant for relieving pain (our primary outcome) and improving disability at short and intermediate-term follow-up. In 2 secondary

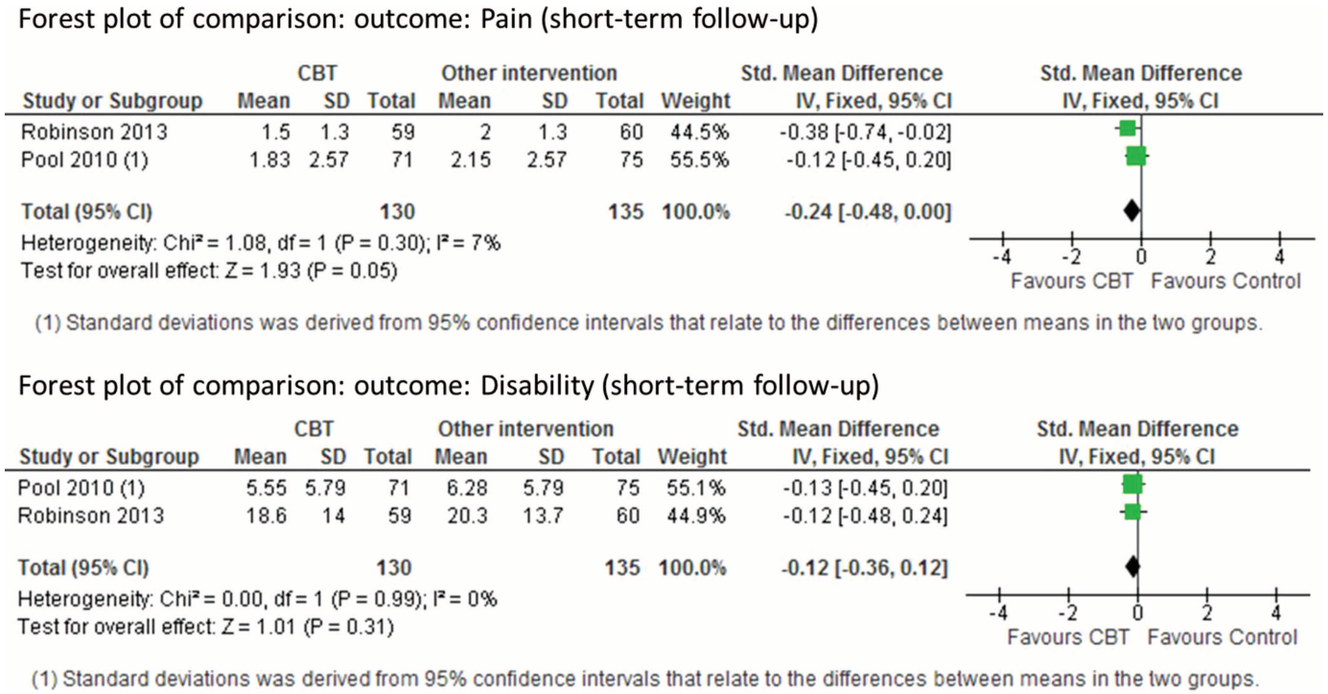

Figure 3. Effects of CBT *vs.* other types of treatment in patients with subacute NP.

analyses CBT was better than other interventions at improving kinesiophobia and at improving depression. However, these benefits might be spurious, or due to the small size of studies and other biases. When comparing CBT plus another intervention to the other intervention alone, we found no evidence for differences in pain relief and disability.

The included studies encompassed a wide range of CBT interventions, such as problem solving, reconditioning of maladaptive thinking patterns, relaxation, management of fear-avoidance behaviours and maladaptive coping strategies. They also differed in terms of health professionals who delivered CBT: most of them did not involve a clinical psychologist but only therapists specifically trained in CBT. We think that planning more clearly targeted interventions, involving a clinical psychologist might help to achieve stronger treatment effects in future studies.

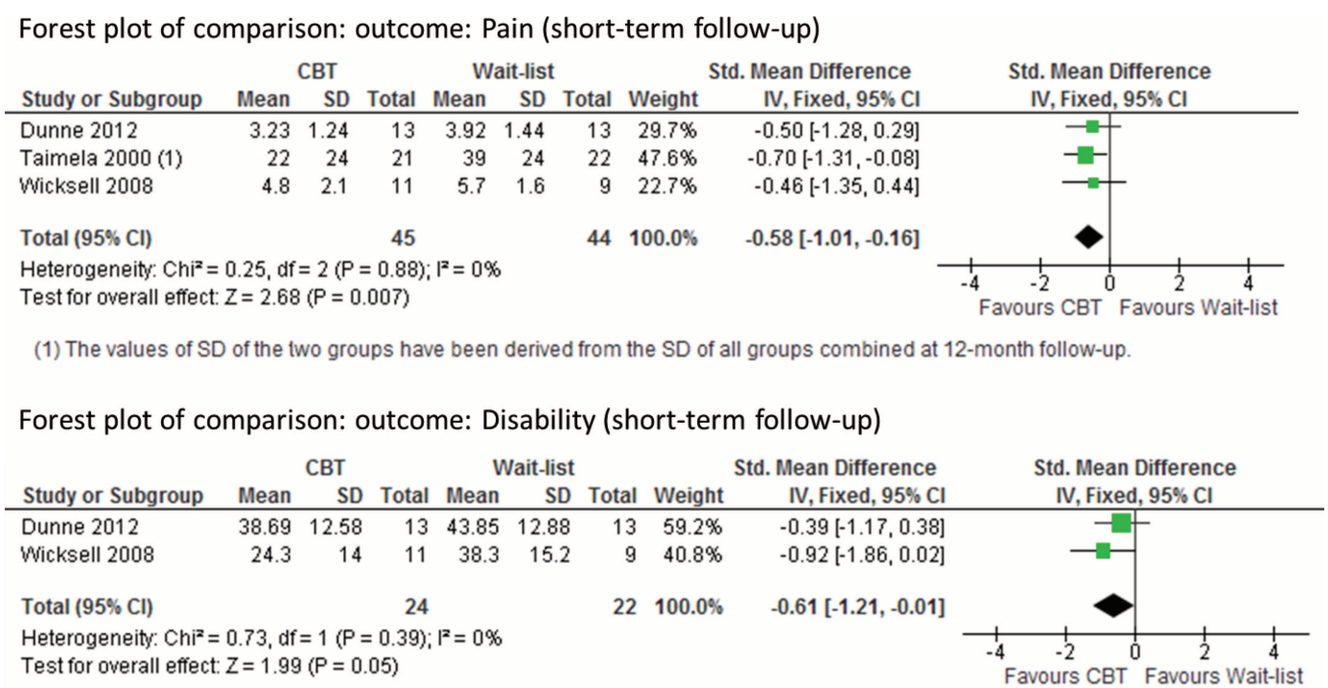

Figure 4. Effects of CBT *vs.* no treatment in patients with chronic NP.

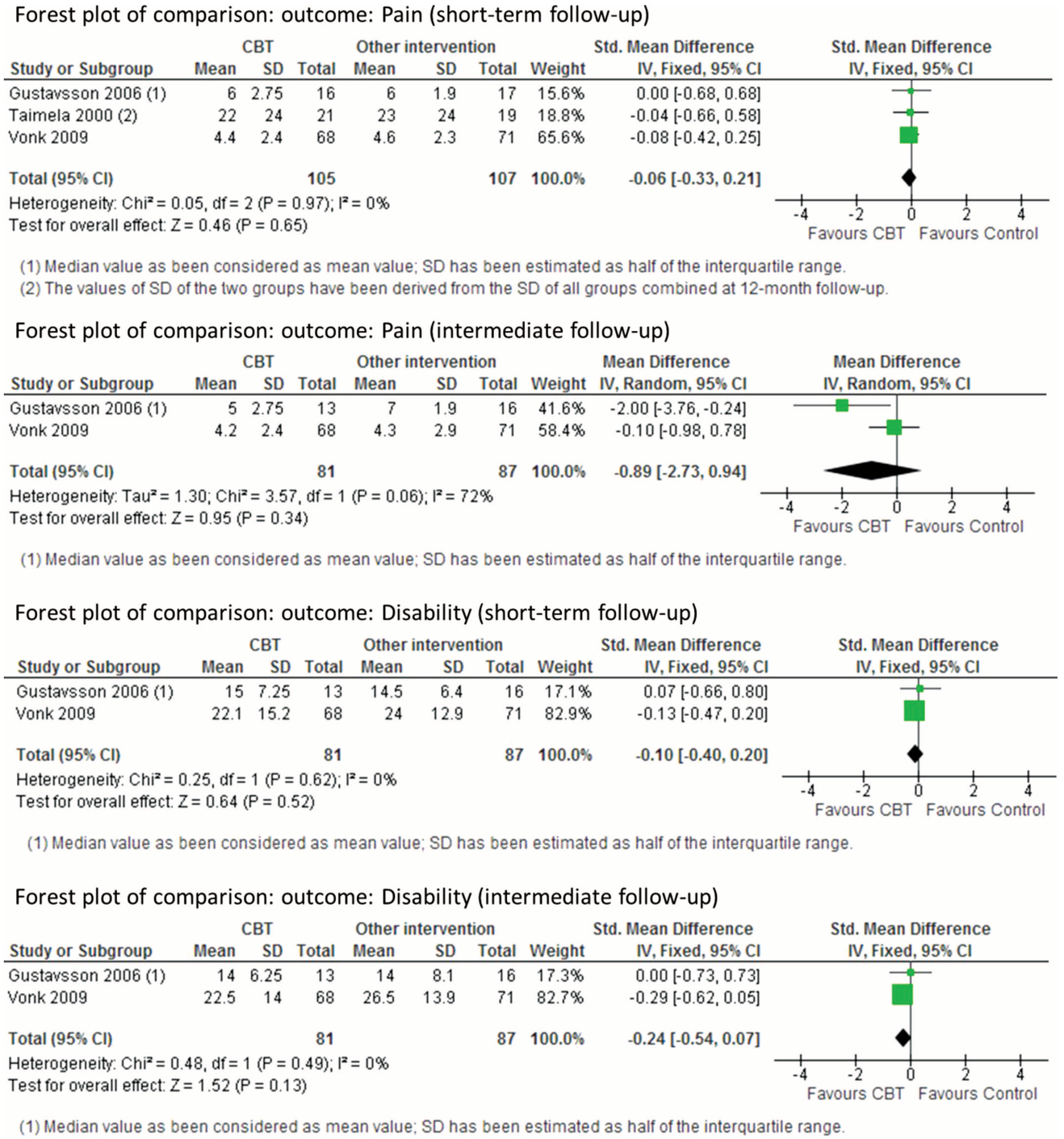

Figure 5. Effects of CBT *vs.* other types of treatment in patients with chronic NP.

The included studies were heterogeneous also in terms of outcome measures. A large variety of cognitive-behavioral outcomes were measured, showing the diversity of constructs. Among them, psychological indicators (*i.e.*, kinesiophobia, coping, and distress), mood symptoms (*i.e.*, depression) and quality of life were the only other outcomes that could be meta-analyzed. Concerning chronic NP, kinesiophobia demonstrated an effect at intermediate-term follow-up only when comparing CBT with another intervention. A small significant difference was found for anxiety between CBT and usual care in chronic NP at intermediate-term follow-up.[20] Catastrophising was measured only in 1 study,[27] showing a significant difference between CBT and conventional exercise at the end of the intervention, which was lost in the long-term. Literature increasingly suggests catastrophising be addressed when planning CBT interventions to achieve stronger treatment effects.[8–12]

The overall quality of the evidence was ranged from very low to moderate. For each outcome, there were fewer than 5

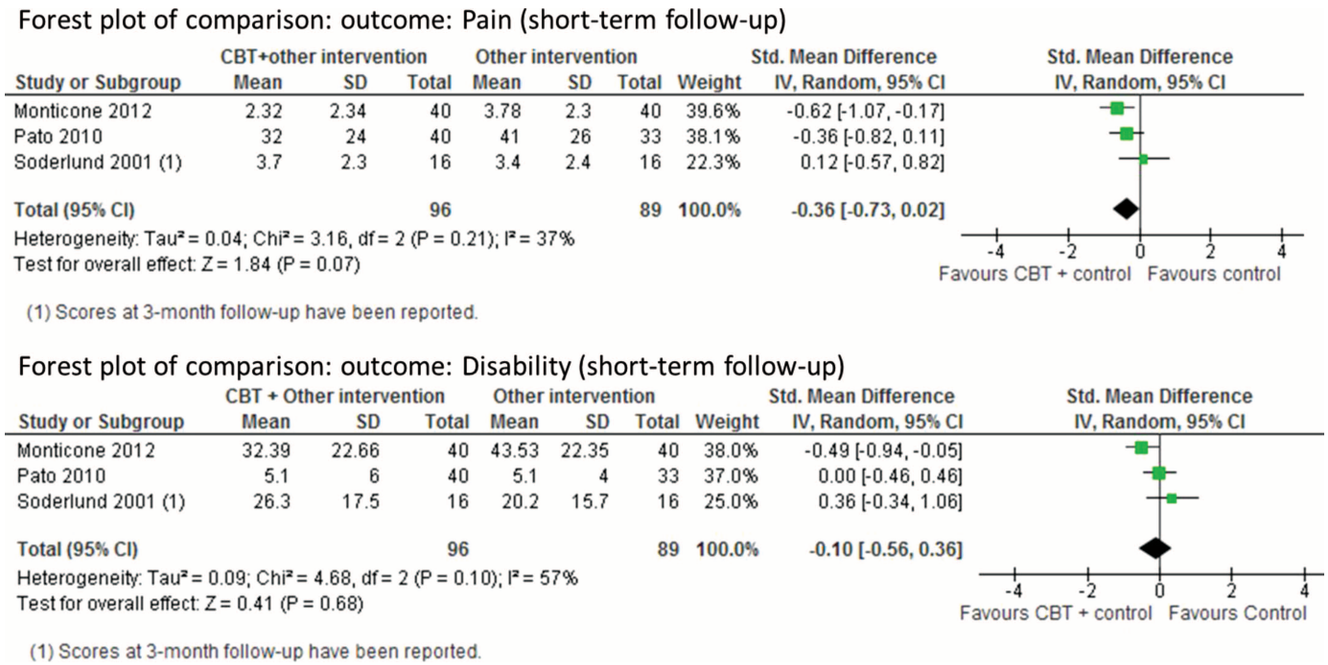

Figure 6. Effects of CBT in addition to another intervention *vs.* the other intervention alone in patients with chronic NP.

studies included in the meta-analysis. Most studies also had small sample sizes. Concerning limitations in the design and implementation, the quality of the evidence was downgraded if more than 25% of the pooled data came from studies with a high risk of bias. For imprecision of the results, we lowered our rating of the quality of the evidence if the pooled sample size was less than the optimal information size. A total number of participants of 300 was computed considering α of 0.05, β of 0.2, and an effect size of 0.3 standard deviations. None of the comparisons satisfied this second cut-off, and thus the evidence was always downgraded at least to moderate quality. The third reason for downgrading was the presence of heterogeneity ($I^2 > 25\%$), which can be explained by clinical reasons (differences in interventions and outcomes).

The risk of bias of the trials included was mostly high. Blinding of patients and care providers was not possible and many of the other criteria used to assess risk of bias were poorly reported. The limitations found in the design and reporting of the included RCTs contributed to the overall judgment, and served to downgrade the quality for most of the comparisons.

None of the included studies reported on whether any adverse effects related to the intervention were observed. This made it difficult to determine whether the benefits gained from CBT are worth the potential harms.

In conclusion, CBT induced statistically significant changes in terms of pain relief and disability in subject with chronic NP only when compared with no treatment. On subacute NP, a statistically significant effect was found on pain relief but not on disability when comparing CBT to other types of interventions. None of these treatment effects could be considered clinically meaningful and there was no evidence about the possibility on maintenance of the effects beyond the short-term in both categories of patients. More research is recommended in order to investigate the long-term benefits and risks of CBT including the different subgroups of NP subjects, to identify which psychological factors have the strongest influence, to promote the involvement of the clinical psychologist and health professionals specifically trained in CBT, to promote more specifically targeted interventions to achieve stronger treatment effects. Future studies should include larger samples, guarantee the blinding of the outcome assessors, specify the method used for randomization and allocation concealment, extensively describe the experimental intervention, assure no or similar cointerventions between groups, and describe possible adverse effects. Longer follow-ups and cost-effectiveness analysis are recommended.

➢ Key Points

- ❑ We found 10 randomized-controlled trials (836 participants in total) evaluating the effects of cognitive-behavioral therapy (CBT) on subacute (2 studies, 337 subjects) and chronic (8 studies, 499 subjects) neck pain.
- ❑ Risk of bias analysis showed an overall high risk of bias in 6 out of 10 studies; the main methodological shortcoming was the blinding of participants, assessors, and care providers, which was inadequate in all of the studies.
- ❑ CBT on subacute neck pain was found to be significantly better than other interventions for short-term pain relief, but this effect could not be considered clinically relevant; in terms

of disability and kinesiophobia, no benefit was found at short-term.

- CBT was shown to induce statistically significant changes on pain and disability in subjects with chronic neck pain only when compared with no treatment, but these effects could not be considered clinically meaningful.
- Due to the low quality of the evidence and the low number of included studies, a conclusion about the usefulness of CBT for patients with neck pain cannot be derived from this review and further research is encouraged.

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