Physical Functioning and Pain in Chronic Low Back Pain: A Systematic Review of Psychometric Properties of Various Outcomes Measures

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INTRODUCTION

- The American Academy of Family Physicians defines Low Back Pain (LBP) as "pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without sciatica"[1]

- LBP is said to be chronic (CLBP) when it persists for 12 weeks or more[1]

- There is no clear consensus about the diagnosis, treatment, and assessment of outcomes for treatment of CLBP[2]

- Since pain is subjective, the effectivity of CLBP treatment is assessed using outcome measures catering to various domains such as pain, quality of life, mood, sleep, and functional capacity (physical, cognitive, emotional, and social).

- A variety of such outcome measures have been used in CLBP randomized controlled trials (RCTs) for assessing efficacy of different treatment options

- The analysis of psychometric properties of such outcome measures will provide a basis for selecting the best measurement instrument for a specific purpose[3]

- Many studies have evaluated the psychometric properties of various physical functioning and pain outcomes measures used in CLBP RCTs.

- It is also important to assess the methodological quality of the studies which have investigated psychometric properties of the CLBP outcome measures[4]

OBJECTIVE

- To evaluate the methodological quality of studies that evaluated psychometric properties of functioning and pain outcome measures for CLBP using Consensus-based Standards for the selection of health status Measurement Instruments (COSMIN) check list
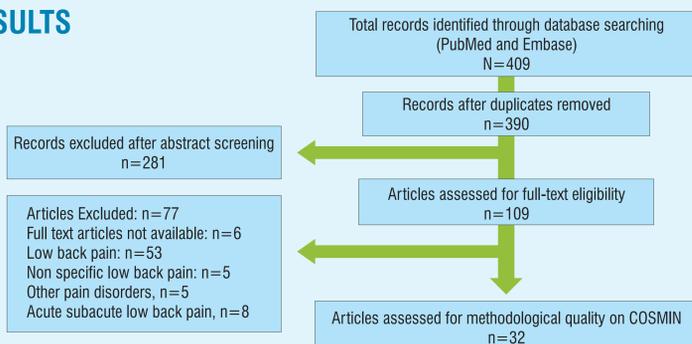
MATERIALS AND METHODS

- A systematic search was conducted following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines

- We searched PubMed and EMBASE databases from inception to June 2015 with specific key words.

- Longitudinal cohort and cross sectional studies which included at least one assessment of psychometric property of outcomes measure in CLBP patients were included.

- Studies published in English language and on humans were included.

- Studies published as reviews, editorials and case reports and other than CLBP were excluded.

- Two reviewers independently performed study selection, data extraction and quality assessment procedures; disagreements between reviewers were resolved through discussion.
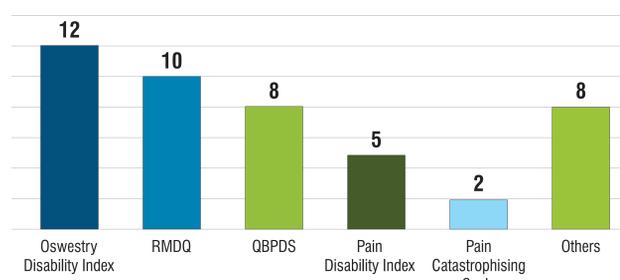
The COSMIN Checklist with 4-point Scale[4]

STEP 1   Evaluated measurement properties in the article: internal consistency, reliability; relative measures (including test–retest reliability, inter-rater reliability, and intrarater reliability), measurement error; absolute measures content validity (including face validity), structural validity, hypothesis testing, cross-cultural validity, criterion validity, responsiveness, and interpretability

STEP 2   Determining whether the statistical method used in the article is based on Classical Test Theory (CTT) or Item Response Theory (IRT): Box General requirements for studies that applied IRT models: excellent/good/fair/poor

STEP 3   Determining whether a study meets the standards for good methodological quality: excellent/good/fair/poor

STEP 4   Determining the Generalizability of the results.

RESULTS


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Total records identified through database searching
(PubMed and Embase)
N=409
        │
        ▼
Records after duplicates removed
n=390
        │
        ▼
Records excluded after abstract screening ◄── 
n=281
        │
        ▼
Articles assessed for full-text eligibility
n=109
        │
        ▼
Articles Excluded: n=77 ◄──
Full text articles not available: n=6
Low back pain: n=53
Non specific low back pain: n=5
Other pain disorders, n=5
Acute subacute low back pain, n=8
        │
        ▼
Articles assessed for methodological quality on COSMIN
n=32
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Outcome Measures Assessed in Reviews

Outcome Measure	Count
Oswestry Disability Index	12
RMDQ	10
QBPDS	8
Pain Disability Index	5
Pain Catastrophising Scale	2
Others	8

Note: Few studies assessed more than one outcome measures; RMDQ = Roland Morris Disability Questionnaire; QBPDS = Quebec back pain disability score; Others include Disability Rating Index, Physical Functioning scale of the SF-36, Numerical Pain Rating Scale, Visual Analogue Scale, Japan Low Back Pain Evaluation Questionnaire, Pain Beliefs and Perceptions Inventory, Chronic Pain Acceptance Questionnaire, Core Outcome Measures Index

RESULTS

- Only 34% of instruments were tested for all psychometric properties and showed mixed methodological quality according to COSMIN check list

- Among all instruments Quebec Back Pain Disability Scale showed excellent reliability (Cronbach's alpha coefficient 0.96) and test-retest reliability (ICC=0.92) for physical functioning assessment

- Pain Catastrophising Scale showed excellent reliability (α=0.92) and high degree test-retest reliability (ICC=0.842).

- More than half of the instruments showed excellent/good reliability

- Around 50% of the instruments showed fair validity.

- Responsiveness was assessed in only nine studies and all showed fair quality.

Key results of reliability
Measures having excellent and good psychometric properties scores on COSMIN

- Pain Catastrophising Scale
- Roland Morris Disability Questionnaire
- Japan Low Back Pain Evaluation Questionnaire
- Oswestry Disability Index
- Pain Beliefs and Perceptions Inventory
- Core Outcome Measures Index

Key results of validity
Measures having excellent construct and content validity on COSMIN

- Chronic Pain Acceptance Questionnaire
- Quebec Back Pain Disability Scale
- Pain Catastrophising Scale
- Roland Morris Disability Questionnaire
- Oswestry Disability Index

DISCUSSION

- Many treatment options are in use for CLBP, but there is no clear consensus as to which treatment modality is the best[5]

- RCTs on CLBP have focused on the statistical significance of change in scores from outcome measures[5]

- Examples for such outcome measures include:
  - Oswestry Disability Index,
  - Roland Morris Disability Questionnaire (RMDQ)
  - Quebec Back Pain Disability Score (QBPDS)
  - Pain disability index
  - Pain catastrophizing scale
  - Disability Rating Index etc.

- For these to be meaningful, the outcome measures considered in these RCTs must be valid and represent the true impact of the intervention on various domains.

- The NICE guidelines for nonspecific LBP recommend that any intervention should have a high impact on patients' outcomes in particular pain, disability or psychological distress[6]

- To achieve comprehensive multidimensional evaluation of outcome in LBP IMMPACT propose six core outcome domains that should be considered:[7]

  (1) pain, (2) physical functioning, (3) emotional functioning, (4) participant ratings of improvement and satisfaction with treatment, (5) symptoms and adverse events and (6) participant disposition.

- Various studies have evaluated the psychometric properties of many of these outcome measures having the core domains in the background

- Our study was done with an intention to assess the methodological quality of some of these studies

CONCLUSIONS

- We found moderate methodological quality for most of the measures to advise tools use based on psychometric properties

- Further research is needed to investigate the psychometric properties of all outcome measures used in CLBP research.

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