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SYSTEMATIC REVIEW

Abstracts of Low Back Pain Trials Are Poorly Reported, Contain Spin of Information, and Are Inconsistent With the Full Text: An Overview Study

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Abstract

Objective: To investigate trials abstracts evaluating treatments for low back pain with regard to completeness of reporting, spin (ie, interpretation of study results that overemphasizes the beneficial effects of the intervention), and inconsistencies in the data with the full text.

Data Sources: The search was performed on the Physiotherapy Evidence Database (PEDro) in February 2016.

Study Selection: This is an overview study of a random sample of 200 low back pain trials published between 2010 and 2015. The languages of publication were restricted to English, Spanish, and Portuguese.

Data Extraction: Completeness of reporting was assessed using the Consolidated Standards of Reporting Trials (CONSORT) for abstracts checklist (CONSORT-A). Spin was assessed using a spin checklist. Consistency between abstract and full text was assessed by applying the assessment tools to both the abstract and full text of each trial and calculating inconsistencies in the summary score (paired *t* test) and agreement in the classification of each item (kappa statistics). Methodologic quality was analyzed using the total PEDro score.

Data Synthesis: The mean number of fully reported items ± SD for abstracts using the CONSORT-A was 5.1±2.4 out of 15 points. The mean number of items ± SD with spin was 4.9±2.6 out of 7 points. Abstract and full text scores were statistically inconsistent ($P = .01$). There was slight to moderate agreement between items of the CONSORT-A in the abstracts and full text (mean kappa ± SD, 0.20±0.13) and fair to moderate agreement for items of the spin checklist (mean kappa ± SD, 0.47±0.09).

Conclusions: The abstracts were incomplete, with evidence of spin and inconsistent with the full text. We advise health care professionals to avoid making clinical decisions based solely upon abstracts. Journal editors, reviewers, and authors are jointly responsible for improving abstracts, which could be guided by amended editorial policies.

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Health care professionals use the results of randomized controlled trials to assist their clinical decision making.[1] However, they should be mindful that trials that are not adequately conducted and reported may tend to overestimate treatment effects.[2] These exaggerated effects can be generated either due to bias in the conduct of the trials or bias in the reporting of the trials.[3,4]

Reading the full report of trial results is necessary to critically appraise evidence.[5,6] However, many health care professionals decide to read the full text of an article only after reading the abstract and some may only have easy access to the abstract.[6,7] Therefore, the completeness of abstracts and consistency with full text are important, also because trial abstracts are also widely used in the screening process of systematic reviews.[8] Common problems with abstracts include incomplete and inadequate reporting[9,10] and inconsistencies between abstract and the full

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Disclosures: The authors declare that, even though 7 out of the 200 articles analyzed involved authors from our research groups, all articles were evaluated with the same criteria and rigor.

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text.[11] Studies that have examined completeness of trial abstracts[12-17] using the Consolidated Standards of Reporting Trials (CONSORT) for abstracts (CONSORT-A) checklist[7] concluded that completeness of reporting of abstracts was poor. There appears to be an association between completeness of reporting and the number of centers,[14] continent where the trial was conducted,[18,19] abstract format,[14] and year of publication of a trial.[18,19] Shiwa et at[20] concluded that English trials were more likely to have better methodologic quality than trials written in other languages, therefore, completeness of reporting of abstracts might also be related to the language. Studies have also found associations between better reporting quality and higher impact factor journals,[12,14,18,19] journals endorsement of the CONSORT recommendations,[12,21] and abstracts with higher word counts.[16] Studies that have compared abstracts and full texts in sports injury prevention,[17] general medicine,[22] pharmacy,[23] and psychology[24] found inconsistencies in 13% to 80% of articles.

Spin of information[25-27] is another factor that can influence the interpretation of abstracts. In research, spin is defined as "a misrepresentation of study results, regardless of motive (intentionally or unintentionally) that overemphasizes the beneficial effects of the intervention and overstates safety compared with that shown by the results."[28(p2)] Spin may occur in a journal publication, academic press releases, or media coverage of research.[27,29-32] A study conducted in the oncology field[33] evaluated the impact of spin of results in trials abstracts using a 7-item spin checklist and showed inconsistencies with the full text, such as selective reporting and overstated treatment effects. To the best of our knowledge, there is no study investigating the association between abstract completeness of reporting and spin of information, or even associating spin in abstracts with journal and trial characteristics.

The issues of abstracts completeness, spin, and inconsistencies with the full text have not been investigated in the low back pain field. This is an important gap to address, as low back pain is ranked the highest of all diseases for years lived with disability and involves high costs worldwide.[34,35] A recent publication in one of the world's leading general medical journals stated that nonpharmacologic interventions, such as physiotherapy (including exercise, education, graded activity, manual therapy), is the preferred first-line treatment option for low back pain[36] and is congruent with guideline recommendations.[37] Our primary questions were (1) are abstracts of low back pain randomized controlled trials incomplete as assessed with the CONSORT-A? (2) do these abstracts contain spin as assessed with the spin checklist? and (3) are these abstracts inconsistent with the full text in completeness and spin? Our secondary questions were (4) is these abstracts' completeness associated with certain trial or journal characteristics? and (5) is abstracts' spin associated with "negative results" (ie, lack of statistical difference for primary outcomes reported, or no difference for primary outcomes reported at all)?

List of abbreviations:

CONSORT	**Consolidated Standards of Reporting Trials**
CONSORT-A	**Consolidated Standards of Reporting Trials for abstracts**
PEDro	**Physiotherapy Evidence Database**

Methods

Eligibility criteria

This is an overview study of 200 trials reporting the results of randomized controlled trials, both abstracts and full text. First, we searched for all randomized controlled trials coded as low back pain, and published between 2010 and 2015, that were indexed on the Physiotherapy Evidence Database (PEDro). We then selected a random sample of 40% from all potentially eligible trials for the study. The selection was performed using the random number function in Excel.[a] PEDro was used because it is one of the most complete indices of published reports of the results of randomized controlled trials evaluating physiotherapy interventions, with no restrictions on language or journal of publication.[38] In addition, all trial reports indexed on PEDro are rated for methodologic quality using the PEDro scale,[39] which enabled us to include methodologic quality as an independent variable in the analyses of trial characteristics associated with abstract completeness. The eligibility criteria were a full-published trial reporting the results of a randomized controlled trial evaluating at least 1 physiotherapy intervention for low back pain; published in 2010 to 2015; inclusive; and written in English, Spanish, or Portuguese. The search strategy performed on PEDro was "clinical trial" for method; "lumbar spine, sacroiliac joint, or pelvis" for body part; "pain" for problem; 2010 to 2015 for year of publication; and English, Spanish, or Portuguese for language. This time period was selected as it was after the release of the CONSORT-A in 2008[7]; therefore, we believe that authors would be prone to use these recommendations. The language of publication was restricted to English, Spanish, and Portuguese, as these were the languages spoken by the authorship team of this study and are among the most common languages of publication on PEDro.[40]

Data collection

Data extraction was divided into 5, to answer our research questions: (1) completeness of reporting of abstracts; (2) spin of information in abstracts; (3) abstract inconsistencies with the full text; (4) association of abstract completeness and abstract spin with trial and journal characteristics; and (5) association of abstract spin with negative results. These sections are described in detail below. Two independent authors extracted data. Disagreements were resolved by discussion or arbitration by a third author. Agreement of data extraction between raters before consensus was calculated using kappa statistics.[41] The agreement was calculated for each item of the CONSORT-A and the spin checklist for both abstract and full text.

Completeness of reporting of abstracts

The 17-item CONSORT-A[7] was used to evaluate completeness of reporting of the abstracts of the included trials. However, we omitted 2 items in our data analyses because they were not relevant to published articles of completed trials: "authors" (ie, related to reporting of the contact details for the corresponding author in conference proceedings) and "recruitment" (ie, indicates phase of recruitment or ongoing). We then modified the CONSORT-A to 15 items. Each item was classified as "fully reported" (if reported all information specified in the item) and "not reported" (if partially reported the information specified in the

item, if no information specified in the item was reported, or when primary outcomes were not specified) for each trial. We also generated a summary score (CONSORT-A score) for each trial by counting the number of items that were "fully reported." The summary score could range from 0 (low level of completeness of reporting) to 15 (high level of completeness of reporting).

We considered primary outcomes to be those identified as "primary outcome" or "main outcome," or any synonyms of the word "outcome" (eg, endpoint). For trials that presented 1 or 2 outcomes only, we considered them as primary.

Spin of information in abstracts

We used a 7-item spin checklist[33] to evaluate spin of information in an abstract by comparing the abstract conclusion to the abstract results. The list has been previously used to measure spin in abstracts of randomized controlled trials in the field of oncology.[33] Each item (items are listed in the results section) was classified as "yes" (ie, the spin was clearly present, the primary outcome results were not reported, or the primary outcome results were omitted, all of which represented that the spin was also present) or "no" (ie, the spin was not present). For example, if the authors of the abstract gave a positive interpretation for a nonsignificant result, we would classify item 6 (overenthusiastic interpretation of outcomes) as "yes." A summary score (spin-abstract score) was calculated by counting the items classified as "yes" (items classified as "no" were considered free of spin of information). The summary score could range from 0 (low levels of spin) to 7 (high levels of spin). At this point, the abstract was assessed in isolation (not compared to the full text). We did this because readers should be able to interpret the trial based on the results section of the abstract.

The criterion for clinically important effects proposed by Ostelo et al[42] was used when scoring item 7 of the spin checklist. These is a: $\geq$15-point difference for the visual analog scale (0-100 points), $\geq$2-point difference for the numeric rating scale (0-10 points), $\geq$5-point difference for the Roland Morris Disability Questionnaire (0-24 points), $\geq$10-point difference for the Oswestry Disability Index (0-100 points), and $\geq$20-point difference for the Quebec Back Pain Disability Scale (0-100 points).

Abstracts inconsistencies with the full text

Abstracts should reflect exactly what the full texts reported. Abstracts have been compared to their corresponding full texts in terms of completeness of reporting of all sections of a study and spin of information in the results and conclusion sections.[11,43]

We used the CONSORT-A and the spin checklist to evaluate inconsistencies in completeness of reporting and presence of spin between the abstract and the corresponding full text, and the reason why we also applied the CONSORT-A and the spin checklist in the full texts. Summary scores were calculated for the full text (CONSORT−full text score and spin−full text score) in order to be comparable to the abstract (CONSORT-A score and spin-abstract score). It was not our intention to analyze completeness of reporting of full texts themselves. In addition to that, for each individual item from the CONSORT-A and the spin checklist, we calculated the agreement of how the item was classified in the abstract with how it was classified in the full text. Each full text was evaluated immediately after its abstract. If an item of the full text was inconsistent with information reported in the abstract, we would rescore such item in the abstract (eg, using the CONSORT-A: if we had classified the results for a primary outcome as "fully reported" in the abstract and in the full text we found out there were 2 primary outcomes which were also "fully reported," we would downgrade the item in the abstract to "not reported").

Description of trial and journal characteristics

To investigate if trial and journal characteristics were associated with abstract completeness and with abstract spin, we defined 2 dependent variables and 10 independent variables. The dependent variables were the CONSORT-A score and the spin-abstract score. The independent variables were: trial conducted in more than 1 center; continent where trial was conducted; language of publication; 2015 journal impact factor; if journal endorses the CONSORT recommendations; number of words in abstract; structured abstract; total PEDro score; spin-abstract score; and number of years since trial publication. For the independent variables, we classified each trial as unicenter or multicenter (ie, if the study had been conducted in 1 or more centers). The country where the study was conducted was extracted and categorized into continents (using dummy variables for "Asia," "Africa," "Europe," "North America," "Oceania," and "South America"). The language was classified as English or non-English. The journal impact factors from 2015 were downloaded from the aggregated journal citations list, Journal Citation Reports.[b] Journal endorsement of the CONSORT recommendations[44] was extracted from the "Instructions to Authors" section for each of the journals or from the CONSORT recommendations' website.[45] The number of words in the abstract was counted using the Microsoft Word[a] "word count" function. The abstracts were classified as structured or not structured.[46] The total PEDro score (0-10 points, higher values indicate better methodologic quality) was downloaded from PEDro. The number of years since trial publication was calculated by subtracting the year of publication from 2015.

Description of negative results

To investigate if trial negative results (ie, statistically nonsignificant or not reported between-group differences for the primary outcomes) were associated with spin we defined 7 independent variables (the individual items of the spin checklist) and 1 dependent variable (presence of statistically significant between-group differences). The presence of statistical between-group differences was determined for primary outcomes (2 at most and preferably pain and disability) and considering up to 4 intervention groups (the maximum number of groups from the included trials), through confidence intervals (CIs) or P values. If the statistical between-group difference was in the opposite direction of the hypothesis for at least 1 primary outcome, the trial was classified as "no" (or no statistical between-group difference). If the between-group difference was not reported for at least 1 primary outcome, the trial was classified as "not reported." If all primary outcomes had statistical between-group differences (in the direction of the hypothesis), the trial was classified as "yes." The trials classified as "no" and "not reported" were considered to have negative results.

For descriptive analysis we also collected the maximum number of words allowed in the abstract by the publishing journal. This was extracted from the "Instructions to Authors" section. Trial abstracts were classified into 4 categories: those that adhered to word limit (ie, word count within 10 words of the word limit);

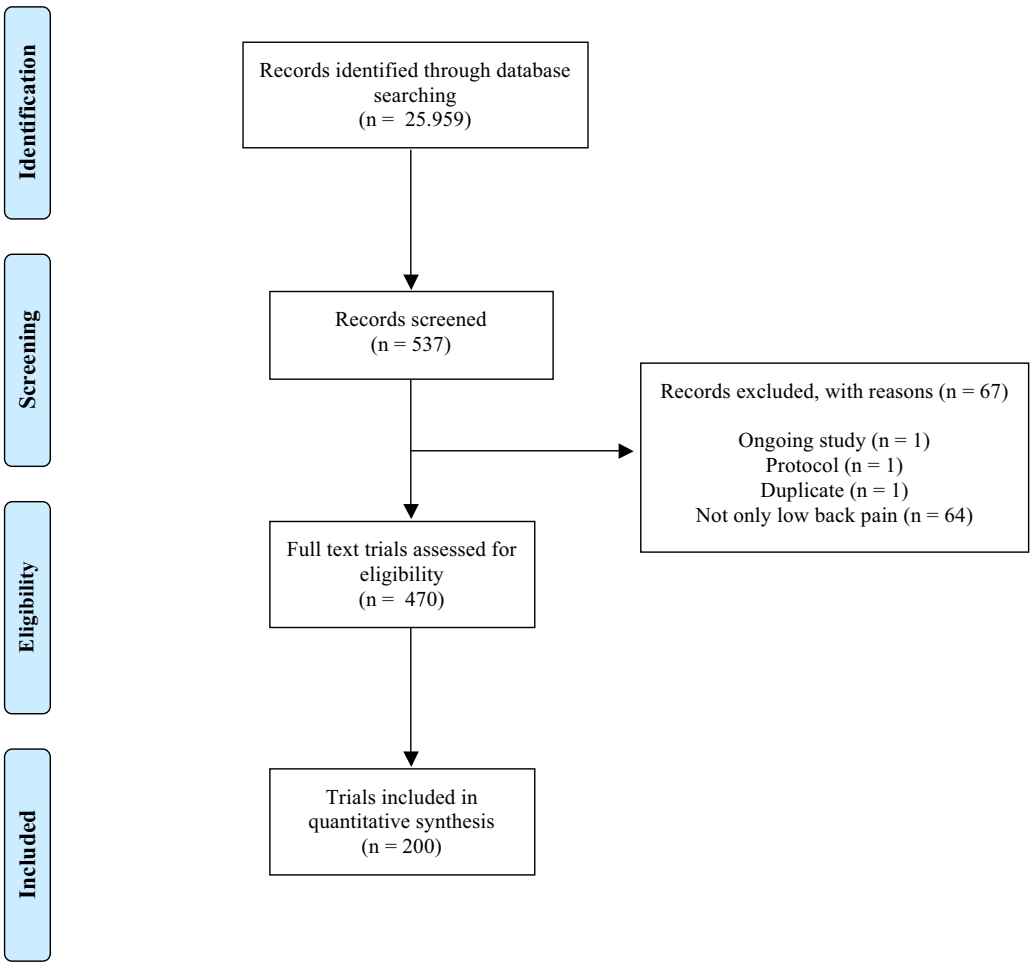

Fig 1 Flow chart.

those that used less words than the word limit; those that exceeded the word limit; and those published in a journal without abstract word limits.

Data analysis

To investigate the completeness of reporting and spin of information in the abstracts, the percentage of articles achieving each item of the CONSORT-A and the spin checklist were tabulated. The mean and SD summary score were calculated for each checklist (CONSORT-A score and spin-abstract score). In order to investigate inconsistencies between abstract and full text, we used paired *t* tests between the CONSORT-A scores with the CONSORT−full text scores and the spin-abstract scores with the spin−full text scores, with $P<.05$. Agreement between the abstract and full text for items 2-15 for the CONSORT-A (item 1 was excluded as it relates to the title) and all items from the spin checklist were calculated using kappa coefficients.[41] Kappa values higher than 0.61 (ie, "substantial" to "almost perfect agreement")[41] were the criterion for "acceptable" agreement between abstract and full text.

Linear regression models were built to evaluate the association between 10 trial and journal characteristics with the CONSORT-A score and the spin-abstract score. We built both univariate and multivariate regression models. The independent variables with $P<.20$ in the univariate model were included in the final multivariate model by using backward elimination method, until all independent variables achieved $P<.05$. Adjusted explained variance (adjusted R^2), beta coefficient (β) and its 95% CIs were reported for each variable with possible association. Linearity was assessed by evaluation of linear relationship of the CONSORT-A score with each independent variable using simple scatter plots.[47] Multicollinearity was tested with bivariate correlation analysis of the CONSORT-A score with each independent variable, and coefficients of independent variables with $r\geq0.7$ were not included in our linear regression model.[48]

Chi-square tests were used to evaluate the association between trials with negative results and the presence of spin in the abstract (ie, classified as "yes") for each item of the spin checklist. All 7 items were evaluated to understand if individual items could have different associations with negative results. SPSS[c] software version 20.0 was used for all analyses.

Results

The search strategy retrieved 537 potentially eligible trial reports from the 25,956 existing trials indexed in the PEDro database on

Table 1 Descriptive data for the included trials (N = 200)

Characteristics	Mean ± SD	No. of Articles (%)
Journal Citation Reports impact factor 2015	2.5±2.5	157 (78.5)
Journals without impact factor		43 (21.5)
Open access articles		115 (57.5)
Written in English		198 (99.0)
Written in Portuguese or Spanish		2 (1.0)
Continents		
Europe		70 (35.0)
Asia		65 (32.5)
North America		33 (16.5)
South America		13 (6.5)
Africa		8 (4.0)
Oceania		11 (5.5)
Multicenter		17 (8.5)
Unicenter		183 (91.5)
Structured abstract		171 (85.5)
Unstructured abstract		29 (14.5)
Age of trial (y)	3.4±1.7	
2010		28 (14.0)
2011		35 (17.5)
2012		36 (18.0)
2013		34 (17.0)
2014		29 (14.5)
2015		38 (19.0)
Statistically significant between-group differences for the primary outcome(s)		70 (35.0)
No statistically significant between-group differences for the primary outcome(s)		96 (48.0)
Did not report between-group differences for the primary outcome(s)		34 (17.0)
Number of words in the abstract	258±67.3	
Articles published in journals with abstract word limits		178 (89.0)
Abstracts that adhered to word limit		49 (24.5)
Abstracts that used less words than the word limit		64 (32.0)
Abstracts that exceeded the word limit		65 (32.5)
Abstracts that published in a journal without abstract word limits		22 (11.0)
Total PEDro score (/10)	5.8±1.6	

February 1, 2016. Trials that were still in the recruitment stage, protocols, duplicates, and those involving not only low back pain were excluded (n = 67) and are detailed in supplemental appendix S1 (available online only at http://www.archives-pmr.org/). From the remaining 470 eligible trials, we randomly selected a sample of approximately 40%, rounded up to 200 trials (supplemental appendix S2, available online only at http://www.archives-pmr.org/), as shown in the flow chart in figure 1. Journals and their impact factors are described in supplemental appendix S3 (available online only at http://www.archives-pmr.org/). Descriptive data for the 200 articles is presented in table 1 and descriptive data of the 97 journals that published the included trials are presented in supplemental appendix S3. Most trials were conducted in Europe or Asia and published in English. Most journals had an impact factor, more than half (51.5%) endorsed CONSORT recommendations, and 38.1% were open access. The methodologic quality of trials is presented in supplemental appendix S4 (available online only at http://www.archives-pmr.org/).

The agreement of data extraction between raters for both abstract and full text ranged from fair to almost perfect (see supplemental appendix S5, available online only at http://www.archives-pmr.org/). For the items of the CONSORT-A the mean kappa ± SD was 0.73±0.18; and for the items of the spin checklist the mean kappa was 0.67±0.11. We then resolved disagreements by consensus.

Completeness of reporting of abstracts

The mean CONSORT-A score ± SD was 5.1±2.4 out of 15 points. Table 2 presents the completeness of reporting for each item of the CONSORT-A. The items with the highest completeness of reporting were specifying the objective (97.0%), interventions (76.5%), and trial design (61.5%). The items with the lowest completeness of reporting were specifying how participants were allocated to groups or randomization (2.0%), blinding (2.5%), and a result for each group and the estimated effect size and its precision for the primary outcomes (4.5%).

Spin of information in abstracts

The mean ± SD spin-abstract score was 4.9±2.6 out of 7 points, indicating that most abstracts overstated the results. Table 3 presents the each item of the spin checklist. The most common problems were failing to mention adverse events

Table 2 Percentage of included trials achieving each item of the CONSORT-A in the abstract and full text (N = 200)

Item	Description	Fully Reported (%)	
		Abstract	Full Text
1. Title	Identification of the study as randomized	58.5	
2. Trial design	Description of the trial design	61.5	63.0
Methods			
3. Participants	Eligibility criteria for participants and the settings where the data were collected	44.5	89.5
4. Interventions	Interventions intended for each group	76.5	90.5
5. Objective	Specific objective or hypothesis	97.0	95.5
6. Outcome	Clearly defined primary outcome for this report	35.0	52.0
7. Randomization	How participants were allocated to interventions	2.0	41.0
8. Blinding	Whether or not participants, caregivers, and those assessing the outcomes were blinded to group assignment	2.5	15.5
Results			
9. Numbers randomized	Number of participants randomized to each group	39.5	89.0
10. Numbers analyzed	Number of participants analyzed in each group	10.5	88.0
11. Outcome	For the primary outcome, a result for each group and the estimated effect size and its precision	4.5	32.5
12. Harm	Important adverse events or side effects	7.0	29.5
13. Conclusions	General interpretation of the results	24.0	34.5
14. Trial registration	Registration number and name of trial register	20.0	32.5
15. Funding	Source of funding	23.5	68.5

(93.5% of abstracts), selective reporting of outcomes (73.0% of abstracts), and recommendation of a treatment (73.0% of abstracts). Ninety-eight percent of the abstracts had at least 1 item of spin.

Abstracts inconsistencies with the full text

Abstracts were reported less completely than the full text ($P = .01$). The mean CONSORT-A score ± SD was 5.1±2.4 out of 15 compared to a mean CONSORT−full text score of 8.2± 3.0, with a mean difference of -3.2 points (95% CI, 2.8-3.5). Agreement between the abstract and full text for 14 items from the CONSORT-A ranged from slight to moderate agreement (mean kappa 0.20±0.14) (supplemental appendix S6). The percentage of trials achieving each individual item of the CONSORT-A for the abstract and full text sections are presented in table 2. No abstracts fully reported all 15 items (the highest number of items achieved was 13), while full reporting of full text occurred for 3.0% of trials.

Abstracts presented more spin of information than the full text ($P = .01$). The mean spin-abstract score was 4.9±2.6 out of 7 and mean spin−full text score was 3.7±2.9, with a mean difference of 1.2 points (95% CI, 0.9-1.5). The ratings for the 7 items from the spin checklist ranged from fair to moderate agreement (mean kappa 0.49±0.11) between the abstract and full text (see supplemental appendix S6, available online only at http://www.archives-pmr.org/). Scoring for the individual items of the spin checklist for both the abstract and full text are presented in table 3. Only 2.0% abstracts and 17.0% full texts scored zero for

Table 3 Percentage of included trials containing each item of the spin checklist in the abstract and full text (N = 200)

Description of Each Item	Yes (%)		No (%)	
	Abstract	Full Text	Abstract	Full Text
1. Omission of primary outcomes	56.0	40.5	44.0	59.5
2. Fail to mention adverse events of interventions	93.5	68.5	6.5	31.5
3. Selective reporting of positive results and omission of negative results of primary outcomes	73.0	53.5	27.0	46.5
4. Fail to report statistically nonsignificant primary outcomes	71.0	51.0	29.0	49.0
5. Focus on statistically significant outcomes other than the primary	62.5	49.0	37.5	51.0
6. Overenthusiastic interpretation of statistically nonsignificant primary outcomes results as effective	61.5	47.5	38.5	52.5
7. Recommendation of a treatment without a clinically important effect on primary outcomes	73.0	60.5	27.0	39.5

NOTE. Abstracts and full texts free of spin are represented in column "no"; columns "yes" represent the percentage of abstracts and full texts presenting spin of information.

Table 4 Final multivariate models of associations between trial and journal characteristics with the CONSORT-A score and the spin-abstract score

	Multivariate Regression			Multivariate Regression		
	Dependent Variable: CONSORT-A Score			Dependent Variable: Spin-Abstract Score		
	Adjusted $R^2=0.55$			Adjusted $R^2=0.17$		
	Constant = 3.74 (95% CI, 1.94-5.54)			Constant = 11.20 (95% CI, 9.28-13.11)		
Independent Variables	β	95% CI	*P*	β	95% CI	*P*
Number of centers			.86	-1.58	-2.77 to -0.39	.01*
Continent			.83			.74
Language			.23†			.25†
Journal impact factor	0.12	0.01-0.23	.04*			.07
Journal endorses CONSORT recommendations	0.76	0.16-1.36	.01*			.26†
Number of words in the abstract	0.01	0.00-0.01	.01*	-0.01	-0.01 to -0.00	.01*
Structured abstract			.46			.58†
Total PEDro score	0.23	0.04-0.42	.02*	-.39	-0.60 to -0.18	.01*
SPIN-Abstract score	-0.47	-0.58 to -0.36	.01*	N/A	N/A	N/A
Age of the article			.83†			.29†

Abbreviation: N/A, not applicable.
* Values with $P<.05$.
† Eliminated in the univariate analysis, values with $P<.20$.

the spin-abstract and spin—full text scores, which means they were free of spin.

Association of abstract completeness and spin with trial and journal characteristics

All variables were included into the linear regression model exploring the association between abstract completeness and spin with trial and journal characteristics. Simple scatter plots confirmed the linearity assumption and bivariate correlation coefficients were all less than 0.31 (ie, multicollinearity assumption). The final multivariate model explained 55% (adjusted $R^2=0.55$) of the variance in completeness of reporting of abstracts and 17% (adjusted $R^2=0.17$) of the variance in spin of information in abstracts (table 4). Higher completeness of abstracts (CONSORT-A score) was associated with higher journal impact factor, journals that endorse CONSORT recommendations, greater number of words in the abstract, higher total PEDro score, and lower spin-abstract score. Lower score of spin in abstracts (spin-abstract score) was associated with multicenter trials, greater number of words in the abstract, and higher total PEDro score.

Association of abstract spin with negative results

Table 5 presents the association between spin of information in the abstract and the presence of negative results for each item of spin checklist. We observed an association ($P<.05$) between negative results for 3 of the 7 items: selectively reported positive results and ignored negative results of primary outcomes; fail to report primary outcomes statistically nonsignificant; and recommendation to use a treatment, if it does not have an important minimal clinical change. In other words, the presence of primary outcome negative results was associated with the presence of spin in the abstract.

Table 5 Association of trials presenting negative results with percentage of abstracts indicating the presence of spin for each of the spin checklist (N = 200)

Description of Each Item	Negative Results, (%)	χ^2 Values	*P* Values
1. Omission of primary outcomes	37.0	0.57	.75
2. Fail to mention adverse events of interventions	60.5	1.31	.52
3. Selective reporting of positive results and omission of negative results of primary outcomes	50.0	15.34	.01*
4. Fail to report statistically nonsignificant primary outcomes	50.0	15.40	.01*
5. Focus on statistically significant outcomes other than the primary	41.0	2.20	.33
6. Overenthusiastic interpretation of statistically nonsignificant primary outcomes results as effective	41.0	3.88	.15
7. Recommendation of a treatment without a clinically important effect on primary outcomes	47.0	11.20	.01*

NOTE. Negative results are the sum of percentage of articles with statistically nonsignificant between-group differences and those that did not report a statistically significant between-group difference.
* Values with $P<.05$.

Discussion

Reporting of abstracts is incomplete in general medicine journals,[49] oncology,[14] and infectious diseases[12] (mean CONSORT-A scores = 12.1 measured on a 17-point scale, 9.9 measured on a 18-point scale, and 7.7 measured on a 17-point scale, respectively). Our analysis of trials evaluating physiotherapy interventions for low back pain appears to have relatively lower completeness of reporting in the abstract (mean CONSORT-A score = 5.1). The description of items related to randomization, blinding, results of primary outcomes, harms, and trial registration were particularly problematic.

The presence of spin of information in abstracts is evident in general medicine, as one study reported 41% of abstracts with at least one type of spin[27] whereas other authors found that 68.1% had spin in at least 1 section of the abstract.[25] The abstracts of trial reports in low back pain appear to contain more spin of information (98.0% of abstracts have at least 1 item of spin) than in other areas of health care. Authors of analyzed trial reports tended to either omit nonsignificant results for primary outcomes or interpret them as beneficial, which can impact health care professionals' interpretation of abstract results.[33]

Consistency between abstracts and the full text is far from perfect in the field of pharmacy (61% classified as inconsistent with the full text),[23] sports injury prevention (80% had at least 1 major inconsistency with the full text),[17] psychology (average of 13% inconsistent abstracts compared to the full text),[24] and medicine (53% had data inconsistencies compared to the full text).[22] Using a differential approach, we have determined that abstracts of trials evaluating physiotherapy interventions for low back pain presented several inconsistencies with their full texts. Important to note that these studies used different statistical approaches, therefore, a direct comparison of our results with the existing literature is not straightforward.

To simplify the evaluation of completeness of reporting and spin, we generated summary scores for the CONSORT-A and the spin checklist, which quantified these constructs as single, dependent variables. Although this scale is not fully validated,[50] the spin checklist presented moderate to almost perfect agreement between raters. The use of summary scores will facilitate future comparisons between different areas of health care and evaluation of strategies to improve reporting and reduce spin.

Spin of information can negatively impact health care as abstracts are commonly used by health care professionals to inform treatment decisions[33] and are widely disseminated in the press and news.[27] Spin can happen for many reasons, including not understanding scientific standards, young researchers copying previous bad practices, unconscious bias, intentional attempts to influence the readers,[51] and academic press releases to attract readers' attention.[27,29-32] In addition, authors favoring or interpreting results as effective, when those are not statistically significant, may induce journal reviewers and editors to accept an article for publication.[52] Whatever the cause of spin, this misinterpretation can potentially damage clinical practice and the integrity of research.[53,54]

It seems that health care journals' editors and reviewers are either unaware of the importance of avoiding abstracts inconsistencies with the full text[55] or not sufficiently trained to detect methodologic or reporting mistakes related to abstracts.[56] Consequently, Moher and Altman[57] described 4 actions to improve the completeness, transparency, integrity, and value of abstracts and papers published: (1) employment of a professional publication officer; (2) developing core competencies for editors and reviewers; (3) training for authors to write complete and transparent papers; and (4) training for peer reviewers. These training efforts could involve raising awareness of the academic community to the available guidelines for reporting studies, ethics in publication, integrity and responsibility in research, as well as highlighting the issue of authors overstating their results.[25] Authors could also be encouraged to write the abstract after the full text has been finalized. Programs with this type of content that target authors, journal editors, and reviewers could and should be implemented.

Our analysis of article characteristics associated with better abstract reporting and avoiding spin in abstracts identified variables that predict better reporting and interpretation. Higher completeness of reporting was associated with publication in journals with higher impact factors and that endorse CONSORT recommendations, greater number of words in the abstract, higher total PEDro score, and a lower spin-abstract score. Additionally, avoiding spin was also related to conducting the trial in more than one center, which may be explained to the fact that different institutions are involved in the writing process and consequently the manuscript is peer reviewed by a broader group of researchers. Two possible strategies involve changing a journal's editorial policies to increase the number of words permitted in the abstract to at least 350 words (500 words ideally) and endorsing (and using) the CONSORT recommendations, including the extension for abstracts. Recommendations on using journal impact factor as reference for publication have been discussed since 2005 and have been considered to be partially inappropriate.[58]

Study strengths and limitations

One of the strengths of this study is the representative sample of 42% of all trials evaluating physiotherapy interventions for low back pain published in 2010 to 2015. Additionally, we used the CONSORT-A[7] to evaluate completeness of reporting. This checklist has been used previously to compare conference abstracts with the abstract subsequently used in the full publication of the trial[17] and seems to be a good measurement tool to compare the level of agreement between abstract and full text in our study. Furthermore, the assessment of spin has been considered to be somewhat subjective and difficult to evaluate.[50] To address this concern, we used a recent developed spin checklist.[33] In the attempt to limit subjectivity, we used 2 reviewers to independently score the included trials, with disagreements resolved by consensus. A limitation of this study was that abstracts not clearly defining the primary outcomes were automatically classified as containing spin of information, as most of the items of the spin checklist relate to the primary outcomes. In order not to overestimate spin, if a trial only reported 1 or 2 outcomes but did not explicitly state that the outcomes were "primary," we considered them to be the primary outcomes when applying the spin checklist. Another limitation relates to the evaluation of agreement between raters, which did not take into account the interdependency of the items in the spin checklist.

Conclusions

Similar to other health care trials, the abstracts of randomized controlled trials evaluating physiotherapy interventions for low back pain are incompletely reported, contain spin of information,

and are inconsistent with the full text. Authors, reviewers, and journal editors need to improve the completeness of reporting and reduce spin of results in abstracts. In order to do so, we encourage journal editors to consider changing some editorial policies, such as increasing the number of words allowed in the abstract and offering adequate training to improve peer reviewers attention to abstracts (in terms of reporting, interpretation of results, and consistency of data between abstract and full text). Journal editors and reviewers should jointly be responsible for improving research integrity, transparency, and ethics in the publication process. Finally, authors of trials should carefully choose journals with strict methodologic and reporting standards for publication, as well as writing the abstract only when the full text has been finalized.

Suppliers

a. Microsoft Excel; Microsoft Corporation.
b. Journal Citation Reports; Clarivate Analytics.
c. SPSS software v. 20; IBM Corp.

Keywords

Abstracting and indexing as topic; Data accuracy; Low back pain; Randomized controlled trials as topic; Rehabilitation

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Supplemental Appendix S1

Excluded Trials

Year	Journal	Title	Reason for exclusion
2010	Physiotherapy Theory and Practice	The use of sensory electrical stimulation for pressure ulcer prevention	Not low back pain, pressure ulcer.
2010	Academic Emergency Medicine	Heat or cold packs for neck and back strain: a randomized controlled trial of efficacy	Not only low back pain, neck and thoracic spine.
2010	BMC Musculoskeletal Disorders	The long-term effects of naprapathic manual therapy on back and neck pain - results from a pragmatic randomized controlled trial	Not only low back pain, neck and thoracic spine.
2010	BMC Musculoskeletal Disorders	The long-term effects of naprapathic manual therapy on back and neck pain - results from a pragmatic randomized controlled trial	Not only low back pain, neck and thoracic spine.
2010	Pain Medicine	Predictors of pain outcomes in patients with chronic musculoskeletal pain co-morbid with depression: results from a randomized controlled trial	Not low back pain, musculoskeletal pain in general.
2010	Physical Therapy	Effects of traditional sit-up training versus core stabilization exercises on short-term musculoskeletal injuries in US army soldiers: a cluster randomized trial	Not low back pain, musculoskeletal injuries in general.
2011	Physiotherapy	Effect of a high-density foam seating wedge on back pain intensity when used by 14 to 16-year-old school students: a randomised controlled trial	Not only low back pain, neck and thoracic spine.
2011	BMC Public Health	Effects on musculoskeletal pain, work ability and sickness absence in a 1-year randomised controlled trial among cleaners	Not low back pain, musculoskeletal pain in general.
2011	Pain Practice	Comparison of acupuncture to injection for myofascial trigger point pain	Not low back pain, myofascial trigger point pain.
2011	The Journal of Rheumatology	Rehabilitation treatment in patients with ankylosing spondylitis stabilized with tumor necrosis factor inhibitor therapy. A randomized controlled trial	Not low back pain, ankylosing spondylitis.
2011	Revista Brasileira de Fisioterapia [Brazilian Journal of Physical Therapy]	Effects of two physical therapy interventions in patients with chronic non-specific low back pain: feasibility of a randomized controlled trial	Partial analysis, study still ongoing.
2011	Pain	Impact of biomedical and biopsychosocial training sessions on the attitudes, beliefs, and recommendations of health care providers about low back pain: a randomised clinical trial	Not low back pain, physiotherapists beliefs.
2011	Italian Journal of Physiotherapy	Effect of a physiotherapy program in the management of musculoskeletal disorders in hairdressers: a randomized controlled trial	Not low back pain, musculoskeletal injuries in general.
2011	Journal of Bodywork and Movement Therapies	Fascial release effects on patients with non-specific cervical or lumbar pain	Not only low back pain, neck and thoracic spine.
2011	Turkish Journal of Rheumatology	Long-term effects of comprehensive inpatient rehabilitation on function and disease activity in patients with chronic rheumatoid arthritis and ankylosing spondylitis	Not low back pain, chronic rheumatoid arthritis and ankylosing spondylitis.
2011	Scandinavian Journal of Work, Environment & Health	Kettlebell training for musculoskeletal and cardiovascular health: a randomized controlled trial	Not low back pain, musculoskeletal pain in general.
2011	Journal of Rehabilitation Medicine	Efficacy of rehabilitation for patients with ankylosing spondylitis: comparison of a four-week rehabilitation programme in a Mediterranean and a Norwegian setting	Not low back pain, ankylosing spondylitis.

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Year	Journal	Title	Reason for exclusion
2011	Scandinavian Journal of Work, Environment & Health	The effectiveness of participatory ergonomics to prevent low-back and neck pain - results of a cluster randomized controlled trial	Not only low back pain, neck and thoracic spine.
2011	European Spine Journal	Long-term effectiveness of a back education programme in elementary school children: an 8-year follow-up study	Not only low back pain, neck and thoracic spine.
2011	Journal of Bodywork and Movement Therapies	The immediate effects of traditional Thai massage on heart rate variability and stress-related parameters in patients with back pain associated with myofascial trigger points	Not only low back pain, neck and thoracic spine.
2011	Indian Journal of Physiotherapy and Occupational Therapy	Effectiveness of coccygeal manipulation in coccydynia: a randomized control trial	Duplicate.
2012	Disability and Rehabilitation	Effectiveness of different interventions using a psychosocial subgroup assignment in chronic neck and back pain patients: a 10-year follow-up	Not only low back pain, neck and thoracic spine.
2012	Journal of Athletic Training	Lumbopelvic joint manipulation and quadriceps activation of people with patellofemoral pain syndrome	Not low back pain, patellofemoral pain syndrome.
2012	Rheumatology International	Effect of Pilates training on people with ankylosing spondylitis	Not low back pain, ankylosing spondylitis.
2012	Medical Science Monitor	The objective evaluation of effectiveness of manual treatment of spinal function disturbances	Not only low back pain, neck and thoracic spine.
2012	Iranian Red Crescent Medical Journal	A randomized clinical trial of fibromyalgia treatment with acupuncture compared with fluoxetine	Not low back pain, fibromyalgia.
2012	Clinical Cases in Mineral and Bone Metabolism	A randomized control trial on the effectiveness of osteopathic manipulative treatment in reducing pain and improving the quality of life in elderly patients affected by osteoporosis	Not low back pain, osteoporosis.
2012	The American Journal of Chinese Medicine	Randomized controlled pilot study: pain intensity and pressure pain thresholds in patients with neck and low back pain before and after traditional East Asian "Gua Sha" therapy	Not only low back pain, neck and thoracic spine.
2012	Pain	A randomized controlled evaluation of an online chronic pain self management program	Not low back pain, chronic pain in general.
2012	Pain	Is there a potential role for attention bias modification in pain patients? Results of 2 randomised, controlled trials	Not low back pain, acute and chronic pain in general.
2012	Journal of Bodywork and Movement Therapies	The effectiveness of the Pilates method: reducing the degree of non-structural scoliosis, and improving flexibility and pain in female college students	Not only low back pain, neck and thoracic spine.
2012	Journal of Physical Therapy Science	Stretching versus mechanical traction of the spine in treatment of idiopathic scoliosis	Not low back pain, scoliosis in the spine.
2013	BMC Musculoskeletal Disorders	Implementation of specific strength training among industrial laboratory technicians: long-term effects on back, neck and upper extremity pain	Not only low back pain, neck and upper limbs.
2013	Journal of Rehabilitation Medicine	A three-week multidisciplinary in-patient rehabilitation programme had positive long-term effects in patients with ankylosing spondylitis: randomized controlled trial	Not low back pain, ankylosing spondylitis.
2013	Journal of Strength & Conditioning Research	Effect of specific resistance training on musculoskeletal pain symptoms: dose-response relationship	Not low back pain, musculoskeletal pain in general.
2013	Turkish Journal of Rheumatology	A comparison of the efficacy of dry needling, lidocaine injection, and oral flurbiprofen treatments in patients with myofascial pain syndrome: a double-blind (for injection groups only), randomized clinical trial	Not low back pain, myofascial pain syndrome.
2013	Spine	Short term usual chiropractic care for spinal pain: a randomised controlled trial	Not only low back pain, neck and thoracic spine.

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Year	Journal	Title	Reason for exclusion
2013	Applied Ergonomics	Office ergonomics training and a sit-stand workstation: effects on musculoskeletal and visual symptoms and performance of office workers	Not low back pain, musculoskeletal pain in general.
2013	Clinical Rehabilitation	Supervised training and home-based rehabilitation in patients with stabilized ankylosing spondylitis on TNF inhibitor treatment: a controlled clinical trial with a 12-month follow-up	Not low back pain, ankylosing spondylitis.
2013	Annals of Agricultural & Environmental Medicine	Physical therapy versus medical treatment of musculoskeletal disorders in dentistry - a randomised prospective study	Not low back pain, musculoskeletal pain in general.
2013	Arthritis Care & Research	Effect of cardiovascular training on fitness and perceived disease activity in people with ankylosing spondylitis	Not low back pain, ankylosing spondylitis.
2013	Spine	Outcomes of Usual Chiropractic Harm (OUCH) randomised controlled trial of adverse events	Protocol.
2013	Clinical and Experimental Rheumatology	Outcome of an education and home-based exercise programme for patients with ankylosing spondylitis: a nationwide randomized study	Not low back pain, ankylosing spondylitis.
2013	Swiss Medical Weekly	Culturally sensitive group therapy for Turkish patients suffering from chronic pain: a randomised controlled intervention trial	Not low back pain, chronic pain in general.
2013	Rheumatology International	The effects of combined spa therapy and rehabilitation on patients with ankylosing spondylitis being treated with TNF inhibitors	Not low back pain, ankylosing spondylitis.
2013	The Journal of Orthopaedic and Sports Physical Therapy	Efficacy of thrust and non-thrust manipulation and exercise with or without the addition of myofascial therapy for the management of acute post-inversion ankle sprain: a randomized clinical trial	Not low back pain, ankle sprain.
2013	Spine	A randomized trial of balloon kyphoplasty and non-surgical management for treating acute vertebral compression fractures: vertebral body kyphosis correction and surgical parameters	Not low back pain, kyphosis correction.
2014	Rheumatology International	Effects of Pilates, McKenzie and Heckscher training on disease activity, spinal motility and pulmonary function in patients with ankylosing spondylitis: a randomized controlled trial	Not low back pain, ankylosing spondylitis.
2014	Journal of Physical Activity & Health	Evaluation of Active Living Every Day in adults with arthritis	Not low back pain, arthritis.
2014	Spine	The effect of work-focused rehabilitation among patients with neck and back pain: a randomised controlled trial	Not only low back pain, neck and thoracic spine.
2014	Fisioterapia em Movimento [Physical Therapy in Movement]	Impact of dry needling and ischemic pressure in the myofascial syndrome: controlled clinical trial	Not low back pain, myofascial pain syndrome.
2014	The Clinical Journal of Pain	Paraspinal stimulation combined with trigger point needling and needle rotation for the treatment of myofascial pain: a randomized sham-controlled clinical trial	Not low back pain, myofascial pain syndrome.
2014	Manual Therapy	Manual therapy directed at the knee or lumbopelvic region does not influence quadriceps spinal reflex excitability	Not low back pain, knee injury.
2014	BMC Musculoskeletal Disorders	Adverse events after manual therapy among patients seeking care for neck and/or back pain: a randomized controlled trial	Not only low back pain, neck and thoracic spine.
2014	International Journal of Therapeutic Massage and Bodywork	Relief from back pain through postural adjustment: a controlled clinical trial of the immediate effects of muscular chains therapy (MCT)	Not only low back pain, musculoskeletal pain in the spine.
2014	PLoS ONE	Efficacy of high intensity exercise on disease activity and cardiovascular risk in active axial spondyloarthritis: a randomized controlled pilot study	Not low back pain, axial spondyloarthritis.

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Year	Journal	Title	Reason for exclusion
2014	Health Psychology	Can we improve cognitive-behavioral therapy for chronic back pain treatment engagement and adherence? A controlled trial of tailored versus standard therapy	Not only low back pain, neck and thoracic spine.
2014	Rheumatology International	Effect of aquatic exercise on ankylosing spondylitis: a randomized controlled trial	Not low back pain, ankylosing spondylitis.
2014	Acupuncture in Medicine	Efficacy and safety of auriculopressure for primary care patients with chronic non-specific spinal pain: a multicentre randomised controlled trial	Not only low back pain, neck and thoracic spine.
2015	Clinical Rehabilitation	Inspiratory muscle training improves aerobic capacity and pulmonary function in patients with ankylosing spondylitis: a randomized controlled study	Not low back pain, ankylosing spondylitis.
2015	Occupational Therapy International	Effect of an exercise programme for the prevention of back and neck pain in poultry slaughterhouse workers	Not only low back pain, neck and thoracic spine.
2015	European Journal of Physical and Rehabilitation Medicine	McKenzie training in patients with early stages of ankylosing spondylitis: results of a 24-week controlled study	Not low back pain, ankylosing spondylitis.
2015	Medicina Clinica	Efectos de un programa de ejercicio fisico y relajacion en el medio acuatico en pacientes con espondiloartritis: ensayo clinico aleatorizado	Not low back pain, spondyloarthritis.
2015	Scandinavian Journal of Work, Environment & Health	Effect of workplace- versus home-based physical exercise on musculoskeletal pain among healthcare workers: a cluster randomized controlled trial	Not low back pain, musculoskeletal pain in general.
2015	BMC Musculoskeletal Disorders	Change in pain, disability and influence of fear-avoidance in a work-focused intervention on neck and back pain: a randomized controlled trial	Not only low back pain, neck and thoracic spine.
2015	Evidence-Based Complementary and Alternative Medicine	BEMER therapy combined with physiotherapy in patients with musculoskeletal diseases: a randomised, controlled double blind follow-up pilot study	Not low back pain, musculoskeletal injuries.
2015	Scientific Reports	Validation of placebo in a manual therapy randomized controlled trial	Not low back pain, migraines.

Supplemental Appendix S2

Included Trials

1. Aboagye E, Karlsson ML, Hagberg J, Jensen I. Cost-effectiveness of early interventions for non-specific low back pain: a randomized controlled study investigating medical yoga, exercise therapy and self-care advice. J Rehabil Med 2015 Feb;47(2):167-73.
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Supplemental Appendix S3

Percentage of trials per journal, 2015 impact factor, CONSORT recommendations endorsement and open access journals (n = 200).

Item	Journal	Percentage (%)	Impact Factor 2015	Endorses CONSORT Recommendations	Open Access Journals
1	Acta Anaesthesiologica Taiwanica	0.5	Not reported	Yes	Yes
2	Acta Clinica Croatica	0.5	0,412	No	No
3	Acupuncture in Medicine	1.0	1,592	Yes	No
4	American Journal of Physical Medicine & Rehabilitation	0.5	2,064	Yes	No
5	An International Quarterly Journal of Research in Ayurveda	0.5	Not reported	Yes	Yes
6	Annals of Family Medicine	0.5	5,087	Yes	Yes
7	Annals of Internal Medicine	1.0	16,440	Yes	No
8	Annals of Rehabilitation Medicine	1.0	Not reported	Yes	Yes
9	Archives of Internal Medicine	0.5	Not reported	Yes	Yes
10	Archives of Physical Medicine and Rehabilitation	2.5	3,045	Yes	No
11	BMC Medicine	1.5	8,005	Yes	Yes
12	BMC Musculoskeletal Disorders	2.0	1,684	Yes	Yes
13	BMC Pregnancy and Childbirth	0.5	2,180	Yes	Yes
14	British Journal of Sports Medicine	1.0	6,724	No	No
15	British Medical Journal	0.5	19,697	Yes	No
16	Caspian Journal of Internal Medicine	0.5	Not reported	No	Yes
17	Chinese Medicine	0.5	1,580	Yes	Yes
18	Chiropractic & Manual Therapies	0.5	Not reported	Yes	Yes
19	Chung I Tsa Chih Ying Wen Pan [Journal of Traditional Chinese Medicine]	0.5	1,023	Yes	Yes
20	Clinical Neurology and Neurosurgery	0.5	1,198	No	No
21	Clinical Rehabilitation	2.5	2,403	No	No
22	Clinical Rheumatology	0.5	2,042	No	No
23	Clinics	0.5	1,328	No	Yes
24	Disability and Rehabilitation	0.5	1,919	No	No
25	Ergonomics	0.5	1,449	No	No
26	European Journal of Pain	1.0	2,900	Yes	No
27	European Journal of Physical and Rehabilitation Medicine	2.0	2,063	Yes	Yes
28	European Spine Journal	1.5	2,132	No	No
29	Evidence-Based Complementary and Alternative Medicine	2.0	1,931	No	Yes
30	Family Practice	0.5	2,022	Yes	No
31	Fisioterapia em movimento	0.5	Not reported	No	No
32	Geriatric Orthopaedic Surgery & Rehabilitation	0.5	Not reported	Yes	Yes
33	Health Technology Assessment	0.5	4,058	Yes	Yes
34	Indian Journal of Physiotherapy and Occupational Therapy	3.5	1,166	No	No
35	International Journal of Clinical and Experimental Medicine	0.5	1,075	No	Yes
36	International Journal of Clinical Practice	0.5	2,226	Yes	No
37	International Journal of Gynaecology and Obstetrics	0.5	1,674	Yes	No
38	International Journal of Neurology and Neurosurgery	0.5	Not reported	No	No
39	International Journal of Nursing Studies	0.5	3,561	Yes	No
40	International Journal of Osteopathic Medicine	0.5	0,509	Yes	Yes
41	International Journal of Pharma and Bio Sciences	0.5	Not reported	No	Yes
42	International Journal of Physiotherapy and Research	0.5	Not reported	No	Yes
43	International Journal of Rheumatic Diseases	0.5	1,914	No	No
44	International Journal of Sports Physical Therapy	0.5	Not reported	Yes	Yes
45	Isokinetics and Exercise Science	0.5	0,357	No	No
46	Joint, Bone, Spine	0.5	Not reported	No	No
47	Journal of Acupuncture and Tuina Science	0.5	Not reported	No	No
48	Journal of Advanced Nursing	0.5	1,917	Yes	No
49	Journal of Alternative & Complementary Medicine	1.0	1,395	Yes	No
50	Journal of Back and Musculoskeletal Rehabilitation	3.5	0,956	No	No

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Item	Journal	Percentage (%)	Impact Factor 2015	Endorses CONSORT Recommendations	Open Access Journals
51	Journal of Bodywork and Movement Therapies	1.5	Not reported	No	No
52	Journal of Clinical Nursing	0.5	1,384	Yes	No
53	Journal of Cognitive and Behavioral Psychotherapies	0.5	Not reported	No	No
54	Journal of Manipulative and Physiological Therapeutics	3.5	1,329	Yes	No
55	Journal of Medical Internet Research	0.5	4,532	Yes	Yes
56	Journal of Musculoskeletal Research	1.0	Not reported	No	No
57	Journal of Physical Therapy Science	5.5	Not reported	No	Yes
58	Journal of Physiotherapy	1.0	4,000	Yes	Yes
59	Journal of Rehabilitation Medicine	2.5	1,595	Yes	Yes
60	Journal of Science and Medicine in Sport	0.5	3,756	No	No
61	Journal of Sport Rehabilitation	0.5	1,612	No	No
62	Lasers in Medical Science	1.0	2,461	No	No
63	Manual Therapy	2.0	1,869	Yes	No
64	Medical Science Monitor	1.0	1,405	No	No
65	Medicine and Science in Sports and Exercise	0.5	4,041	No	No
66	Military Medicine	0.5	0,969	Yes	No
67	Neurosciences	0.5	0,541	Yes	Yes
68	New Zealand Journal of Physiotherapy	0.5	Not reported	No	No
69	Nigerian Journal of Clinical Practice	0.5	0,524	Yes	Yes
70	Pain	1.5	5,557	Yes	No
71	Pain Medicine	0.5	2,324	No	No
72	Pain Practice	0.5	2,317	Yes	No
73	Photomedicine and Laser Surgery	0.5	1,631	No	No
74	Physical Therapy	4.0	2,779	Yes	No
75	Physiotherapy	0.5	1,814	Yes	No
76	PLoS ONE	0.5	3,057	Yes	Yes
77	PM&R	1.0	1,655	Yes	No
78	Psychology, Health & Medicine	0.5	1,347	No	No
79	Rawal Medical Journal	0.5	Not reported	No	Yes
80	Revista de Investigacion Clinica	0.5	0,477	No	No
81	Revista Paulista de Medicina [Sao Paulo Medical Journal]	0.5	0,955	Yes	Yes
82	Rheumatology International	0.5	1,702	Yes	No
83	South African Journal of Physiotherapy	1.0	Not reported	No	Yes
84	Southern Medical Journal	0.5	0,882	No	No
85	Spine	8.0	2,439	Yes	No
86	Swiss Medical Weekly	0.5	1,549	No	Yes
87	The American Journal of the Medical Sciences	0.5	1,757	No	No
88	The Clinical Journal of Pain	2.0	2,712	No	No
89	The Journal of International Medical Research	1.0	1,431	Yes	No
90	The Journal of Manual & Manipulative Therapy	0.5	Not reported	No	Yes
91	The Journal of the American Medical Association	0.5	Not reported	Yes	No
92	The Journal of the American Osteopathic Association	1.0	Not reported	No	No
93	The Spine Journal	2.5	2,660	Yes	No
94	The West Indian Medical Journal	0.5	Not reported	No	No
95	Turk Fizyoterapi ve Rehabilitasyon Dergisi [Turkish Journal of Physiotherapy and Rehabilitation]	0.5	Not reported	No	Yes
96	Turkish Neurosurgery	0.5	0,508	Yes	Yes
97	Turkiye Fiziksel Tip ve Rehabilitasyon Dergisi [Turkish Journal of Physical Medicine and Rehabilitation]	0.5	Not reported	No	Yes

Supplemental Appendix S4

Methodologic quality of the 200 trials, measured by the PEDro scale [44, 45]. Data presented for the total PEDro score.

First Author	Year	Journal	Total PEDro Score 0/10
Aboagye	2015	Journal of Rehabilitation Medicine	6
Alayat	2014	Lasers in Medical Science	5
Albaladejo	2010	Spine	7
Albert	2012	Spine	7
Aleksiev	2014	Spine	4
Alp	2014	Turkish Journal of Physical Medicine and Rehabilitation	6
Aluko	2013	Journal of Manipulative and Physiological Therapeutics	7
Apeldoorn	2012	European Spine Journal	7
Apeldoorn	2012	Spine	8
Bajaj	2010	Indian Journal of Physiotherapy and Occupational Therapy	5
Becker	2012	Spine	7
Bello	2010	Journal of Musculoskeletal Research	4
Bi	2013	The Journal of International Medical Research	7
Bronfort	2014	Annals of Internal Medicine	8
Bronfort	2011	The Spine Journal	8
Bruce-Low	2012	Ergonomics	5
Cambron	2014	Journal of Manipulative and Physiological Therapeutics	6
Campello	2012	Military Medicine	6
Cecchi	2012	European Journal of Physical and Rehabilitation Medicine	4
Chan	2011	Archives of Physical Medicine and Rehabilitation	7
Chen	2015	Clinical Neurology and Neurosurgery	6
Chen	2012	Acupuncture in Medicine	8
Chiauzzi	2010	Pain Medicine	6
Cho	2015	Journal of Physical Therapy Science	4
Christiansen	2010	Pain	6
Chuang	2012	Spine	5
Cramer	2013	Journal of Manipulative and Physiological Therapeutics	5
Cruz-Diaz	2015	Disability and Rehabilitation	8
Cuesta-Vargas	2012	Clinical Rheumatology	8
Cuesta-Vargas	2011	American Journal of Physical Medicine & Rehabilitation	6
de Oliveira	2013	Physical Therapy	8
del Pozo-Cruz	2013	Psychology, Health & Medicine	4
del Pozo-Cruz	2013	Clinical Rehabilitation	5
del Pozo-Cruz	2011	Journal of Rehabilitation Medicine	7
del Pozo-Cruz	2012	Journal of Rehabilitation Medicine	7
Demir	2014	European Journal of Physical and Rehabilitation Medicine	4
Dogan	2011	Southern Medical Journal	5
Dougherty	2014	Geriatric Orthopaedic Surgery & Rehabilitation	8
Eadie	2013	Archives of Physical Medicine and Rehabilitation	7
Ebadi	2012	BMC Musculoskeletal Disorders	8
Facci	2011	Sao Paulo Medical Journal	7
Fatemi	2015	Journal of Back and Musculoskeletal Rehabilitation	4
Ferrari	2015	Rheumatology International	5
Fiore	2011	European Journal of Physical and Rehabilitation Medicine	4
Flack	2015	BMC Pregnancy and Childbirth	6
Ford	2015	British Journal of Sports Medicine	6
Franca	2012	Journal of Manipulative and Physiological Therapeutics	4
Franca	2010	Clinics	7
Fritz	2015	The Journal of the American Medical Association	8
Froholdt	2011	The Spine Journal	6
Ganesh	2015	Journal of Back and Musculoskeletal Rehabilitation	5

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First Author	Year	Journal	Total PEDro Score 0/10
Garcia	2013	Physical Therapy	6
Garcia	2015	Physical Therapy	6
George	2011	BMC Medicine	6
Grunnesjo	2011	Clinical Rehabilitation	7
Gunay	2014	Turkish Journal of Physiotherapy and Rehabilitation	7
Gupta	2012	Indian Journal of Physiotherapy and Occupational Therapy	2
Guthrie	2012	Journal of Sport Rehabilitation	6
Gutke	2010	Journal of Rehabilitation Medicine	6
Haakstad	2015	Journal of Rehabilitation Medicine	7
Haas	2014	The Spine Journal	5
Han	2011	Journal of Physical Therapy Science	4
Hartvigsen	2010	BMC Musculoskeletal Disorders	7
Hasegawa	2014	Acupuncture in Medicine	8
Hellum	2011	British Medical Journal	8
Henchoz	2010	Spine	6
Henchoz	2010	Swiss Medical Weekly	7
Henry	2014	The Spine Journal	6
Hidalgo	2015	Journal of Manipulative and Physiological Therapeutics	8
Hill	2015	Physical Therapy	6
Hoffman	2011	Manual Therapy	5
Homayouni	2015	Journal of Musculoskeletal Research	6
Hsieh	2014	Lasers in Medical Science	9
Huber	2011	Isokinetics and Exercise Science	6
Hugli	2015	Journal of Bodywork and Movement Therapies	7
Hurley	2015	Pain	6
Hwang	2013	Journal of Physical Therapy Science	4
Jacobson	2015	Evidence-Based Complementary and Alternative Medicine	7
Jain	2012	Indian Journal of Physiotherapy and Occupational Therapy	3
Jaromi	2012	Journal of Clinical Nursing	6
Javadian	2015	Caspian Journal of Internal Medicine	5
Javadian	2012	Journal of Back and Musculoskeletal Rehabilitation	4
Jensen	2012	BMC Musculoskeletal Disorders	5
Jensen	2015	Chiropractic & Manual Therapies	5
Jensen	2012	BMC Medicine	7
Johnsen	2014	Spine	5
Kamali	2012	Journal of Bodywork and Movement Therapies	6
Kawu	2011	Nigerian Journal of Clinical Practice	5
Kendall	2015	Journal of Science and Medicine in Sport	8
Khatri	2010	Indian Journal of Physiotherapy and Occupational Therapy	3
Kim	2015	International Journal of Osteopathic Medicine	8
Kluge	2011	International Journal of Gynaecology and Obstetrics	7
Kordi	2013	Journal of Back and Musculoskeletal Rehabilitation	5
Krammer	2015	New Zealand Journal of Physiotherapy	6
Kumar	2011	International Journal of Neurology and Neurosurgery	5
Lamb	2010	Health Technology Assessment	5
Lara-Palomo	2013	Clinical Rehabilitation	7
Lawand	2015	Joint, Bone, Spine	8
Learman	2013	Journal of Manipulative and Physiological Therapeutics	5
Lee	2015	Journal of Physical Therapy Science	5
Lee	2014	Journal of Physical Therapy Science	5
Lewis	2011	Journal of Physiotherapy	7
Licciardone	2013	The Journal of the American Osteopathic Association	7
Licciardone	2012	The Journal of the American Osteopathic Association	4
Licciardone	2013	Annals of Family Medicine	9
Lin	2015	PLoS ONE	6
Lomond	2014	Manual Therapy	5
Lu	2015	International Journal of Clinical and Experimental Medicine	5

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First Author	Year	Journal	Total PEDro Score 0/10
Lurie	2014	Spine	5
Macedo	2010	Fisioterapia em movimento	5
Macedo	2012	Physical Therapy	8
Machado	2010	BMC Medicine	8
Mannion	2013	The Spine Journal	5
Masse-Alarie	2013	The Clinical Journal of Pain	6
Mattila	2011	European Spine Journal	7
McGregor	2012	Spine	1
McMorland	2010	Journal of Manipulative and Physiological Therapeutics	6
Meng	2011	The Clinical Journal of Pain	6
Miyamoto	2013	Physical Therapy	8
Monro	2015	Journal of Back and Musculoskeletal Rehabilitation	6
Monticone	2015	European Journal of Pain	8
Moon	2013	Annals of Rehabilitation Medicine	8
Moon	2015	Journal of Physical Therapy Science	4
Moore	2012	The American Journal of the Medical Sciences	3
Morone	2011	European Journal of Physical and Rehabilitation Medicine	6
Morris	2011	Spine	3
Naik	2010	Indian Journal of Physiotherapy and Occupational Therapy	4
Naqaish	2013	Rawal Medical Journal	4
Nassif	2011	Archives of Physical Medicine and Rehabilitation	8
Natour	2015	Clinical Rehabilitation	8
Nazzal	2013	Neurosciences	7
Nemcic	2013	Acta Clinica Croatica	5
Oestergaard	2012	Spine	6
Ohtsuki	2012	Journal of Physical Therapy Science	2
Okafor	2012	South African Journal of Physiotherapy	2
Oke	2013	The West Indian Medical Journal	4
Olmedo-Buenrostro	2010	Revista de Investigacion Clinica	5
Omar	2012	International Journal of Rheumatic Diseases	5
Onac	2012	Journal of Cognitive and Behavioral Psychotherapies	6
Ozdemir	2015	Journal of Advanced Nursing	7
Ozkara	2015	Turkish Neurosurgery	6
Pach	2013	Evidence-Based Complementary and Alternative Medicine	5
Park	2014	Journal of Physical Therapy Science	4
Parreira	2014	Journal of Physiotherapy	9
Petersen	2011	Spine	7
Prommanon	2015	Journal of Physical Therapy Science	7
Pushpika	2010	An International Quarterly Journal of Research in Ayurveda	3
Ratajczak	2011	Journal of Back and Musculoskeletal Rehabilitation	4
Rhee	2012	Medical Science Monitor	5
Riva	2014	Journal of Medical Internet Research	6
Rogerson	2010	Pain Practice	4
Sakulsriprasert	2010	Indian Journal of Physiotherapy and Occupational Therapy	4
Saliba	2010	International Journal of Sports Physical Therapy	7
Saper	2013	Evidence-Based Complementary and Alternative Medicine	7
Selhorst	2015	The Journal of Manual & Manipulative Therapy	7
Senna	2011	Spine	8
Sharma	2011	Indian Journal of Physiotherapy and Occupational Therapy	5
Sheeran	2013	Spine	6
Sherman	2011	Archives of Internal Medicine	7
Shin	2013	Pain	8
Siemonsma	2013	Physical Therapy	7
Simmerman	2011	PM&R	4
Sokunbi	2014	South African Journal of Physiotherapy	5
Son	2014	Journal of Physical Therapy Science	3
Sorensen	2010	BMC Musculoskeletal Disorders	6

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First Author	Year	Journal	Total PEDro Score 0/10
Suni	2013	Spine	5
Szlezak	2011	Manual Therapy	4
Szulc	2015	Medical Science Monitor	4
Tavafian	2011	The Clinical Journal of Pain	6
Tellez-Garcia	2015	Journal of Bodywork and Movement Therapies	7
Tilbrook	2011	Annals of Internal Medicine	5
Tilbrook	2014	Physiotherapy	4
Unsgaard-Tondel	2010	Physical Therapy	7
Vallone	2014	Photomedicine and Laser Surgery	5
Vasseljen	2010	Manual Therapy	6
Verma	2013	International Journal of Physiotherapy and Research	5
Vibe	2013	European Journal of Pain	6
Vidal	2013	European Spine Journal	5
Vieira-Pellenz	2014	Archives of Physical Medicine and Rehabilitation	8
Vincent	2014	PM&R	6
Vong	2011	Archives of Physical Medicine and Rehabilitation	6
Wajswelner	2012	Medicine and Science in Sports and Exercise	7
Wand	2013	British Journal of Sports Medicine	5
Wand	2012	The Clinical Journal of Pain	6
Weis	2013	Journal of Alternative & Complementary Medicine	9
Xia	2011	Journal of Acupuncture and Tuina Science	3
Yardley	2010	Family Practice	3
Yeh	2010	Acta Anaesthesiologica Taiwanica	2
Yeh	2011	International Journal of Nursing Studies	8
Yildirim	2010	Journal of Back and Musculoskeletal Rehabilitation	4
Yoo	2014	International Journal of Clinical Practice	4
Yoon	2012	Annals of Rehabilitation Medicine	5
You	2014	Clinical Rehabilitation	6
You	2015	Journal of Physical Therapy Science	4
Yuan	2013	Evidence-Based Complementary and Alternative Medicine	7
Yun	2012	Journal of Alternative & Complementary Medicine	6
Zahari	2014	International Journal of Pharma and Bio Sciences	3
Zaringhalam	2010	Chinese Medicine	6
Zhang	2014	The Journal of International Medical Research	6
Zheng	2012	Journal of Traditional Chinese Medicine	6

Supplemental Appendix S5

Agreement of data extraction between the two authors who collected the data. Kappa coefficient is presented for each item of the CONSORT-A and the SPIN-checklist for both abstract and full text (n = 200).

Item	Description	Kappa Coefficient
CONSORT-A applied to the abstracts	1. Title	0.96
	2. Trial design	0.94
	3. Participants	0.76
	4. Interventions	0.47
	5. Objective	0.52
	6. Outcome	0.84
	7. Randomization	0.75
	8. Blinding	0.66
	9. Numbers randomized	0.87
	10. Numbers analyzed	0.72
	11. Outcome results	0.35
	12. Harms	0.81
	13. Conclusions	0.53
	14. Trial registration	0.94
	15. Funding	0.87
CONSORT-A applied to the full-text	1. Title	0.96
	2. Trial design	0.91
	3. Participants	0.69
	4. Interventions	0.57
	5. Objective	0.65
	6. Outcome	0.90
	7. Randomization	0.70
	8. Blinding	0.54
	9. Numbers randomized	0.58
	10. Numbers analyzed	0.84
	11. Outcome results	0.60
	12. Harms	0.77
	13. Conclusions	0.40
	14. Trial registration	0.92
	15. Funding	0.87
	Range from fair to almost perfect agreement	Mean 0.73 (SD 0.18)
SPIN-checklist applied to the abstracts	1. Omission of primary outcome	0.82
	2. Fail to mention adverse events	0.80
	3. Selective reporting of outcomes	0.53
	4. Fail to report statistically non-significant outcomes	0.57
	5. Focus on statistically significant outcomes	0.68
	6. Over-enthusiastic interpretation of outcomes	0.66
	7. Recommendation of a treatment	0.49
SPIN-checklist applied to the full-text	1. Omission of primary outcome	0.81
	2. Fail to mention adverse events	0.79
	3. Selective reporting of outcomes	0.65
	4. Fail to report statistically non-significant outcomes	0.71
	5. Focus on statistically significant outcomes	0.63
	6. Over-enthusiastic interpretation of outcomes	0.71
	7. Recommendation of a treatment	0.53
	Range from moderate to almost perfect agreement	Mean 0.67 SD (0.11)

Supplemental Appendix S6

Agreement between abstract and full text for the classifications of each item of the CONSORT-A and the SPIN-checklist (n = 200). Calculated with Kappa coefficient.

Item	Description	Kappa Coefficient
CONSORT-A classified as "fully reported" and "not reported". The checklist was applied to the abstract and to the full text.	1. Title	*Not applicable
	2. Trial design	0.33
	3. Participants	0.12
	4. Interventions	0.16
	5. Objective	0.10
	6. Outcome	0.45
	7. Randomization	0.03
	8. Blinding	0.19
	9. Numbers randomized	0.10
	10. Numbers analyzed	0.03
	11. Outcome results	0.18
	12. Harms	0.21
	13. Conclusions	0.51
	14. Trial registration	0.18
	15. Funding	0.25
	Range from slight to moderate agreement	Mean 0.20 (SD 0.14)
SPIN-checklist classified as "yes" and "no". The checklist was applied to the abstract and to the full text.	1. Omission of primary outcome	0.50
	2. Fail to mention adverse events	0.26
	3. Selective reporting of outcomes	0.49
	4. Fail to report statistically non-significant outcomes	0.48
	5. Focus on statistically significant outcomes	0.57
	6. Over-enthusiastic interpretation of outcomes	0.53
	7. Recommendation of a treatment	0.57
	Range from fair to moderate agreement	Mean 0.49 (SD 0.11)

* Note: The first item is 'Not applicable' because it is related to the title. Standard Deviation (SD).