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ORIGINAL ARTICLE

Comparison of risk factors predicting return to work between patients with subacute and chronic non-specific low back pain: systematic review

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Abstract The objective of the study was to provide an inventory of predictive instruments and their constituting parameters associated with return to work in patients with subacute (2–10 weeks pain duration) and chronic (10–24 weeks pain duration) non-specific low back pain (NSLBP). Data sources included systematic review in Medline, Embase, Cinahl, Central, PEDro, Psyndex, PsychInfo/PsycLit, and Sociofile up to September 2008, in reference lists of systematic reviews on risk factors, and of included studies. For the systematic review, two reviewers independently assessed study eligibility and quality, and extracted data. Disagreements were resolved by consensus. Risk factors were inventorised and grouped into a somatic and psychosocial domain. 23 studies reporting on subacute and 16 studies reporting on chronic patients were included. The studies on subacute patients reported on a total of 56 biomedical factors out of which 35 (63%) were modifiable and 61 psychosocial factors out of which 51 (84%) were modifiable. The corresponding values in studies on chronic patients were 44 biomedical [27 (62%) modifiable] and 61 [40 (66%) modifiable] respectively. Our data suggest that the interdisciplinary approach in patients at risk to develop persistent NSLBP is justified in both, the subacute and chronic disease stages. Psychosocial interventions might be more effective in subacute stages since a higher proportion of modifiable risk factors were identified in that group.

Keywords Back pain · Occupational diseases · Return to work · Prognostic indicators · Systematic review

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Background

Low-back pain is one of the most important reasons for GP visits in developed countries. In the UK, for example, low-back pain accounts for about 7 million GP visits annually [1]. Whereas the majority of low back pain patients recover without a specific intervention within a few weeks, only about 20% of the affected will remain on sick leave and about half of them will stay on prolonged sick leave or sustained restriction in function [2]. This small proportion of patients with persistent symptoms account for about 80% of the total costs of NSLBP [2].

From a clinical perspective it remains challenging to tailor the most appropriate therapies considering both, clinical outcome and costs. Guidelines suggest that patients at risk for delayed recovery should be identified early and receive a multifaceted therapy considering biological,

psychological and social factors [3, 4]. These programmes aim to improve functional restoration and promote return to work. Various studies showed advantage of a biopsychosocial approach compared to an isolated biomedical approach [5, 6]. However, to our knowledge there has been no study investigating to what extent the biopsychosocial approach is superior to a psychosocial approach in patients with chronic NSLBP non-specific low back pain. Arguably, the biopsychosocial approach is only justified if biomedical risk factors still play a major role in patients with delayed recovery. We therefore performed two systematic reviews, one focusing on risk factors of patients with subacute NSLBP, and one focusing on risk factors of patients with chronic NSLBP. We aimed at categorising risk factors into a biomedical and a psychosocial domain and aimed at comparing the proportions in the subacute and chronic stage. The final aim was then to draw a conclusion regarding the usefulness of biomedical interventions in patients with chronic unspecific low back pain.

Methods

Identification of studies

We searched Medline (PubMed Version), Embase (Ovid interface), PsychINFO/PsychLIT, Cinahl, Central, PEDro, Psyndex, Sociofile from inception to October 2008. The full search algorithm is available on request.

In addition, we checked the reference lists of the included publications, relevant systematic reviews, relevant articles on the topic, guidelines, expert reports, and the 'related articles' query in Medline. We imposed no language restrictions. Health care professionals with sufficient knowledge of the given language assessed articles in other languages than English, e.g. German, French, Spanish or Italian.

Study selection

An epidemiologist and an information specialist defined the search strategy applying previously published rigorous methods [7]. Two reviewers screened the titles, keywords, and abstracts of all retrieved records. The agreement between reviewers for study selection was good (kappa = 0.73). We looked for prospective cohort studies reporting on biomedical and psychosocial factors related to return to work in patients suffering from subacute (2–10 weeks pain duration) or chronic (10–24 weeks pain duration) NSLBP. In the case of multiple publications on the same study population, all publications were retrieved to gather the most possible information. Two independent evaluators classified each factor as modifiable or not modifiable. In the event of disagreement consensus was reached between evaluators.

Data extraction

One reviewer extracted the salient features from each study using a data extraction form that was pre-tested using one of the included studies. A second reviewer double-checked the extraction form for discrepancies. From each study data regarding setting (e.g., year, country of origin), gender, mean age and number of participants were documented (Table 1).

Assessment of study quality

One reviewer assessed the methodological quality of each included study. Based on existing recommendations [8] we developed a quality assessment form (see "Appendix"). Items were either rated as yes, no, partially or not known.

Results

Through our search we retrieved 5,784 records from which 479 records appeared to be potentially relevant for subacute patients and 554 records for chronic patients. Full text assessment resulted in exclusion of 452 articles reporting on subacute patients and 545 articles reporting on chronic patients. Finally, we included 23 studies assessing 59–1,885 subacute patients [9–31] and 16 studies assessing 76–945 chronic patients [32–42]. For details on study selection please see Fig. 1.

Description of studies

Publication years ranged from 1988 to 2008. The mean age of subacute patients ranged from 30 to 48 years, and for the chronic patients from 39 to 49 years. The proportion of male patients ranged from 33 to 88% in the subacute populations (except one study, where only men were included) and from 32 to 76% in the chronic populations. The proportion of men over all studies was 67% for the subacute group and 60% for chronic group. The studies were conducted in eight different countries including Canada, Denmark, Germany, Israel, Netherlands, Norway, Sweden, and USA. For details see Table 1.

Parameters of return to work

Table 2 shows the distribution of risk factors for return to work for the subacute and chronic group, which were

Table 1 Summary of the included studies

	Dionne	Dionne	Dionne	Faber	Hagen	Heymans	Heymans	Hunt	Loisel	Lötters	Öhlund	Okurowski	Pransky	Prkachin
Category	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Year	2005	2007	2007	2006	2005	2006	2007	2002	2002	2006	1996	2003	2006	2007
Country of origin	Can	Can	Can	Ned	Nor	Ned	Ned	Can	Can	Ned	Swe	USA	USA	USA
Number of participants	1,007	369	491	103	257	299	628	192	104	129	101	986	494	192
Gender (% males)	59	0	100	76	52	79	79	73	54	70	70	74	78	72
Mean age	39	39	39	NR	41	40	41	41	40	43	41	36	37	40
Total number of risk factors	111	111	111	19	30	27	22	17	5	39	5	22	22	11
Not significant	104	104	96	16	21	21	17	15	2	36	1	18	13	7
Significant	7	7	15	3	9	6	5	2	3	3	4	4	9	4
Biomedical modifiable	2	1	3	1	4	2	1	0	3	2	1	0	1	1
Biomedical non-modifiable	2	1	5	2	1	0	2	1	0	0	0	1	3	0
Psychosocial modifiable	3	2	4	0	3	4	2	1	0	1	3	3	3	3
Psychosocial non-modifiable	0	3	3	0	1	0	0	0	0	0	0	0	2	0

	Shaw	Schultz	Schultz	Soucy	Truchon	Turner	Turner	Van der Weide	Van der Weide	Weber	Bloch	Bloch	Bloch
Category	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	CH	CH	CH
Year	2007	2004	2005	2006	2005	2006	2008	1998	1998	1998	2000	2000	2000
Country of origin	USA	USA	USA	Can	Can	USA	USA	Ned	Ned	Ger	Den	Ger	Isr
Number of participants	140	192	111	437	439	1,068	1,885	120	59	662	494	295	289
Gender (% males)	100	72	62	57	56	69	68	33	39	67	46	64	74
Mean age	30	40	41	39	39	39	39	39	38	48	41	49	39
Total number of risk factors	21	49	49	16	12	13	62	19	19	10	43	43	38
Not significant	19	46	47	13	8	11	53	15	16	6	33	35	30
Significant	2	3	2	3	4	2	9	4	3	4	10	8	8
Biomedical modifiable	2	1	0	0	1	0	5	1	2	1	2	1	1
Biomedical non-modifiable	0	0	0	1	1	0	0	0	0	1	1	2	0
Psychosocial modifiable	0	2	2	2	2	2	3	3	1	2	4	3	4
Psychosocial non-modifiable	0	0	0	0	0	0	1	0	0	0	3	2	3

	Bloch	Bloch	Bloch	Bradisch	Halldorsen	Halldorsen	Hannson	Indahl	Indahl	Lancourt	Storheim	Van der Giezen	Weber
Category	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
Year	2000	2000	2000	1998	1998	1998	2000	1995	1998	1992	2005	2000	1998
Country of origin	Ned	Swe	USA	Can	Nor	Nor	[a]	Nor	Nor	USA	Nor	Ned	Ger
Number of participants	392	455	413	120	260	76	[a]	975	245	79	93	298	257
Gender (% males)	61	39	44	76	64	51	[a]	61	64	NR	[c]	NR	70
Mean age	40	44	42	[b]	41	42	[a]	NR	41	NR	~40	39	[d]

Table 1 continued

	Bloch	Bloch	Bloch	Bradisch	Halldorsen	Halldorsen	Hannson	Indahl	Indahl	Lancourt	Storheim	Van der Giezen	Weber
Total number of risk factors	42	41	39	1	23	28	19	3	28	34	42	36	24
Not significant	30	33	31	1	16	24	2	1	25	25	39	31	21
Significant	12	8	8	0	7	4	17	2	3	9	3	5	3
Biomedical modifiable	3	4	3	0	2	0	4	0	0	2	2	2	1
Biomedical non-modifiable	2	1	1	0	3	0	4	1	0	1	0	1	0
Psychosocial modifiable	5	2	2	0	1	1	9	1	1	3	1	1	2
Psychosocial non-modifiable	2	1	2	0	1	1	0	0	2	3	0	1	0

SA subacute, *CH* chronic, *Can* Canada, *Den* Denmark, *Ger* Germany, *Isr* Israel, *Ned* Nederlands, *Nor* Norway, *Swe* Sweden, *NR* not reported

[a] Hansson [36]: Denmark: $N = 494$, 46% male, mean age 41; Germany: $N = 295$, 64% male, age = 49; Israel: $N = 289$, 74% male, age = 39; Netherlands: $N = 392$, 61% male, age = 40; Sweden: $N = 455$, 39% male, age = 44; USA: $N = 413$, 56% male, age = 42

[b] Bradish [33]: Group non-specific 35.3, Group degenerative 45.5

[c] Storheim [40]: 32% in NRTW, 52% in RTW

[d] Weber [42]: 47 Group RTW, 52 Group nRTW

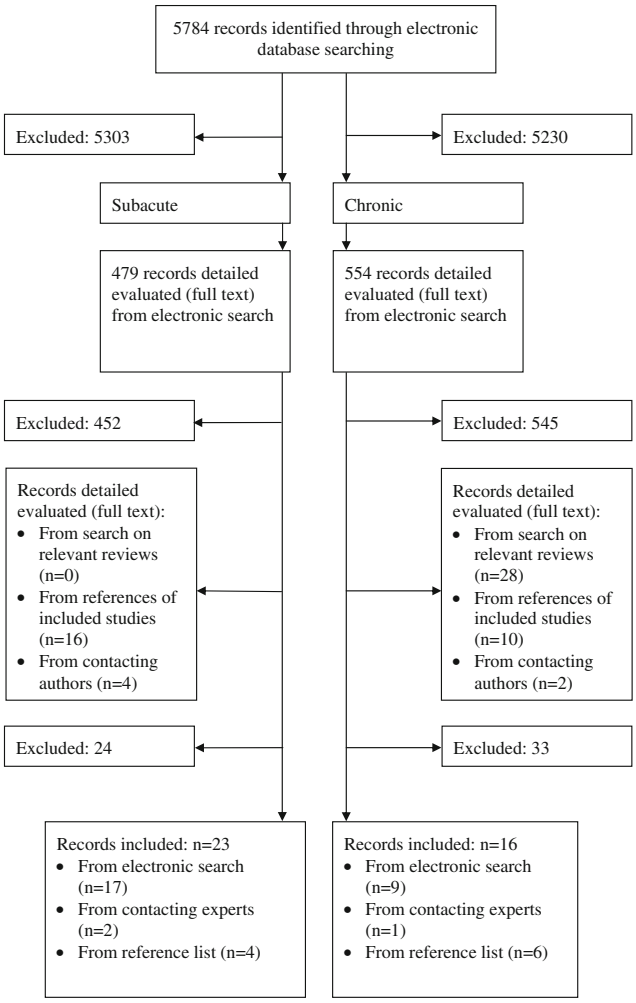

Fig. 1 Identification and selection of studies

Table 2 Number of risk factors (modifiable/non modifiable)

	Subacute	Chronic	Total
Biomedical	56 (35/21) 63%	44 (27/17) 62%	100 (62/38)
Psychosocial	61 (51/10) 84%	61 (40/21) 66%	122 (91/31)

stratified for the two biomedical (modifiable and not modifiable) and psychosocial domains (modifiable and not modifiable).

Predictors for return to work

Studies on subacute patients reported 117 significant ($P < 0.05$) predictors in the model, out of which 56 were biomedical (35 modifiable, 21 non-modifiable) and 61 psychosocial (51 modifiable, 10 non-modifiable). Studies on chronic patients reported 105 significant ($P < 0.05$) predictors in the model, out of which 44 were biomedical (27 modifiable, 17 non-modifiable) and 61 psychosocial (40 modifiable, 21 non-modifiable).

Discussion

Main findings

To our knowledge this is the first meta-epidemiologic study comparing risk factors for return to work in two populations of patients with a different duration of NSLBP. We found that the pattern of risk factor does not change markedly with increasing duration of symptoms. We observed a higher rate of modifiable psychosocial factors at earlier stages compared to later stages. Our findings are in accordance with findings by Waddell et al. [43]. They showed that at the subacute stage psychosocial factors play a eminent role in development of chronic NSLBP. Our data suggest that psychosocial interventions might be more effective at an early disease stage since we found a higher proportion of modifiable factors in the subacute group compared to the chronic group. Finally our data support current LBP guidelines recommending a multidisciplinary approach of physicians, physiotherapists and psychologists irrespective of the duration of symptoms.

Strengths and limitations

One strength of this study is the application of a robust systematic review methodology. We made strenuous efforts to minimize the risk of selection bias. Another strength is that relevant reports were searched systematically without language restriction. The definition and clinical implementation of non-specific LBP remains a problem. Some of the studies reviewed included patients with nerve root irritation. We decided to include these studies, as the suggested management of this diagnosis is the same as for NSLBP unless there are severe and progressive neurological deficits. There is a lack of consistency concerning the predictors included in the selection process for the models and the predictors retained in the final models.

Implications for research

The predictive values and their generalizability are moderate in the studies included. This is not surprising, bearing in mind that many factors influence these values in LBP patients: unstable course of LBP, large differences of risk profile in different settings, interventions, changing risk profile over time, large amount of factors influencing return to work, some are rare, but if present they are strong predictors. We assume that the inconsistencies between predictors of the included studies are due to the inclusion of patients with different risk profiles, different interventions, and different instruments that were used to identify a predictor. However, we were unable to perform statistical analyses confirming this suspicion.

In a recent publication by Hayden and co-workers about the quality of systematic reviews in the field of prognostic low back pain research the authors identified various methodological flaws on both, the study and review level [44]. While we think that we ruled out most of the shortcomings observed in the Hayden review in our study, we agree with their observation that prognostic studies, particularly in the field of low-back pain research need further methodological improvement. We propose the inclusion of existing standardized instruments completed with additional risk factors related to the biopsychosocial model (e.g. patients attitudes and beliefs, e.g. about recovery and future work capability, and work situation (measured work load and self-perceived work situation), family context, social relationships at work place, local economy, etc.), assessed at a common and clinically relevant time point (e.g. between 4 and 12 weeks pain duration) in a sufficiently large population. The process of validation should follow expert recommendations [45–49]. Another important issue relates to the reporting of primary studies. We propose that future authors of observational studies in the field of low back pain consult the recently published STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) [8] reporting guidelines. The experience of earlier initiatives to improve reporting such as the Consort, STARD and QUOROM statements [7] showed promising improvements.

Conclusions

Our data suggest that the interdisciplinary approach in patients at risk to develop chronic NSLBP is justified in both, the subacute and chronic stage. Psychosocial interventions might be more effective in subacute stages since a higher proportion of modifiable risk factors were identified in that group.

Appendix

Quality assessment form

1. Were the hypothesis/aim/objective of the study clearly described (prognostic)?
2. Were the patients enrolled consecutive?
3. Were the main characteristics of the included patients in the study clearly described?
4. Was the response rate at baseline at least 80% of the possibly eligible patients?
5. Were the psychosocial data collected with validated instruments?
6. Were data on physical workload collected?
7. Was a clear definition of non-specific low back pain used?

8. Was the treatment standardized?
9. Were prognostic factors that were assessed addressed by treatment?
10. Statistical adjustment for important prognostic factors?
1. Were the statistical methods adequately described?
11. Was the outcome clearly defined?
12. Were the outcome measures available for at least 80% of the included patients?
13. Was the model cross validated in a group of patients different from the group in which it was derived, preferably with different clinicians?
14. Was there a serious methodological flaw not covered by the check-list?

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