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Prevalence of low back pain in different educational levels: a systematic review

Prevalência de dor lombar em diferentes níveis educacionais: uma revisão sistemática

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Abstract

Introduction: Non-specific low back pain (LBP) can be understood through the interaction of biopsychosocial factors such as education. Unfortunately, it remains unclear whether education can be considered an important risk and prognostic factor for the occurrence of LBP. **Objective:** To investigate the association between education and LBP. **Methods:** The following databases were searched: MEDLINE, EMBASE, Cochrane, AMED and PsyINFO. **Results:** Thirteen studies were included in the review. The *Prevalence Critical Appraisal Instrument* (PCAI) was used to assess risk of bias. Methodological quality scores ranged from 7 to 10 on a scale of 0-10. There was a 23% (95% CI, 13-37) prevalence of LBP (10,582 out of a total of 99,457 cases) in the general sample at the time of assessment. The meta-analysis of studies on the prevalence of LBP in people with low, medium or high educational level found the following results, respectively: 24% (95% CI, 12-43), 27% (95% CI, 9-56), and 18% (95% CI, 5-50). The meta-regression identified heterogeneity among the studies included in the review. This can be explained by educational differences ($p < 0.05$). **Conclusion:** Occurrence of LBP varies according to educational level. Individuals with higher educational levels are less often affected by LBP than individuals with medium or low educational levels.

Keywords: Low Back Pain. Prevalence. Education.

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Resumo

Introdução: *A dor lombar inespecífica (DL) pode ser compreendida através da interação de fatores biopsicossociais, como por exemplo a educação. Infelizmente, ainda não é sabido se a educação é uma característica social importante como fator de risco e prognóstico para a ocorrência de DL.* ***Objetivo:*** *Investigar a associação entre educação e ocorrência de DL.* ***Métodos:*** *Buscas em MEDLINE, EMBASE, Cochrane, AMED e PsyINFO.* ***Resultados:*** *Incluídos 13 estudos na revisão. Para o risco de viés foi utilizado a* Prevalence Critical Appraisal Instrument *(PCAI) obtendo na avaliação da qualidade metodológica os escores menor e maior de 7 e 10 em uma escala de 0 a 10. Amostra geral compreendeu prevalência de DL no momento da avaliação de 23% (IC95% 13 até 37), sendo 10582 o número de casos em 99457. Meta-analysis com estudos investigando prevalência de DL no momento da avaliação em pessoas de baixo, médio e alto nível educacional estimou respectivamente os valores 24% (IC95% 12 até 43), 27% (IC95% 9 até 56), e 18% (IC95% 5 até 50). Meta-regressão identificou heterogeneidade entre os estudos incluídos e essa pode ser explicada pelo nível educacional (p < 0,05).* ***Conclusão:*** *Ocorrência de DL varia de acordo com o nível educacional, onde indivíduos com nível educacional mais alto possuem menor ocorrência de DL quando comparados com indivíduos com nível educacional baixo ou médio.*

Palavras-chave: *Dor Lombar. Prevalência. Educação.*

Introduction

Spinal problems are one of the most common reasons for clinical visits and the leading cause of disability in the adult population [1]. Non-specific low back pain (LBP) affects approximately 70-80% of workers in industrialized cities at some point in life, leading to cases of retirement due to functional disability [2]. About 10 million Brazilians have disabilities due low back pain and 70% of the Brazilian population will experience pain episodes at some time in life [3]. Moreover, due to the high incidence and prevalence of disability in people of economically active age, LBP is considered a public health problem [3].

Our knowledge of risk factors and predisposition to LBP may benefit substantially from bibliographic searches [1, 4, 5]. LBP may be understood through the interaction of risk factors and biopsychosocial prognostic factors that are determined by physical (e.g., physical strength), psychological (e.g., kinesiophobia) and social aspects (e.g., social support) [4, 5]. In this context, education is the best substitute to measure social status, because it is easy to collect information on it and it is not likely to be affected by chronic diseases [6]. This provides a rapid and useful strategy for a more complex understanding of the set of social factors that predispose the occurrence of LBP [6-13]. Education is one of the social factors often studied in relation to LBP [6-15].

Despite the fact that primary observation and sample characterization are present in several studies, it remains unclear whether education is an important social characteristic to be used as a risk and prognostic factor for the occurrence of LBP. Thus, systematic reviews may make it possible to identify findings that elucidate the impact of formal education as a risk and prognostic factor for LBP. Moreover, we believe that these findings may suggest procedures for individual and collective physical therapy treatment of this morbidity. Given the above, the aim of this study was to undertake a systematic review to investigate the association between educational level and the occurrence of LBP.

Methods

We searched the electronic databases MEDLINE (via OVID), EMBASE, Cochrane, AMED and PsyINFO. The searches were conducted between May 1 and 31, 2015. We used keywords related to “low back pain”, “prevalence” and “education”. There were no restrictions on language or publication date. All the studies included in the review met the following

criteria: 1) to investigate the LBP of any duration, in patients of both sexes aged 18 years or over; and 2) to associate formal education with the presence or absence of LBP. Papers on conditions specific for the occurrence of LBP, such as fractures, tumors, infection, inflammation, cauda equina syndrome, radiculopathy and pregnancy (non-specific low back pain), were excluded.

Studies selection process

After removing duplicates and screening titles and abstracts, full-text versions of potential papers were selected. A reviewer (AASB) assessed the full versions of the texts according to the inclusion and exclusion criteria. Adjudication by a second reviewer (NH) resolved any ambiguity regarding study inclusion.

Data extraction

Two reviewers (AASB and NH) extracted data using a standardized form. Disagreements were resolved by consensus. Discrepancies were resolved as needed by a third investigator (VCO) who made the final decision. The data were extracted as follows: 1) study design; 2) population characteristics; 3) measures of formal education; and 5) measures of LBP prevalence by educational level.

Risk of bias

Studies were assessed for methodological quality by one reviewer (AASP) using the *Prevalence Critical Appraisal Instrument* (PCAI) [16]. The PCAI assesses studies for methodological quality based on 10 questions with four reply options ("yes", "no", "unclear" and "does not apply"). The questions refer to: 1) representativeness of the population; 2) sample selection; 3) sample size; 4) subjects' details; 5) sample conduction and identification; 6) objective, standard criteria used for the measurement of the condition; 7) reapplicability of the measure; 8) appropriate statistical method; 9) confounding factors, subgroups, etc.; and 10) subpopulations identified using objective criteria. A second reviewer (NH) resolved any uncertainties in relation to the assessment through discussion and by consensus with the first reviewer.

Statistical Analysis

Due to differences in the classification of formal education used in the studies, this variable had to be reclassified to allow for synthesis of data. The reclassification was performed by two reviewers (AASB and VCO), who defined three categories (low, medium and high), based on the Brazilian education classification criteria. The number of years of formal education was classified as follows: 0 - 9 years as low educational level; 10 - 12 years as medium educational level; 13 or more years as high educational level [17]. This allowed a cutoff value to be defined for the studies and uncertainties were resolved by consensus between the authors.

LBP prevalence for each educational level was estimated and meta-analysis was conducted whenever possible. I^2 statistics [18] was used to determine the possibility of performing meta-analysis. Whenever $I^2 < 50\%$, meta-analysis was conducted using a fixed-effect model, whereas a random-effects model was used when $I^2 \geq 50\%$. If even after using a random-effects model, $I^2 \geq 50\%$, then the results were described qualitatively. Prevalence was presented as percentage, with 95% confidence interval (95% CI). Meta-regression was carried out to test whether educational level could explain the heterogeneity found in LBP prevalence for all groups of educational levels. All the analyses were conducted using the Comprehensive Meta-analysis software, version 2.2.04 (Biostat, Inc.©, Englewood, New Jersey).

Results

Studies selection process

Figure 1 shows a flowchart of the studies process, as well as the total number of original studies included for review.

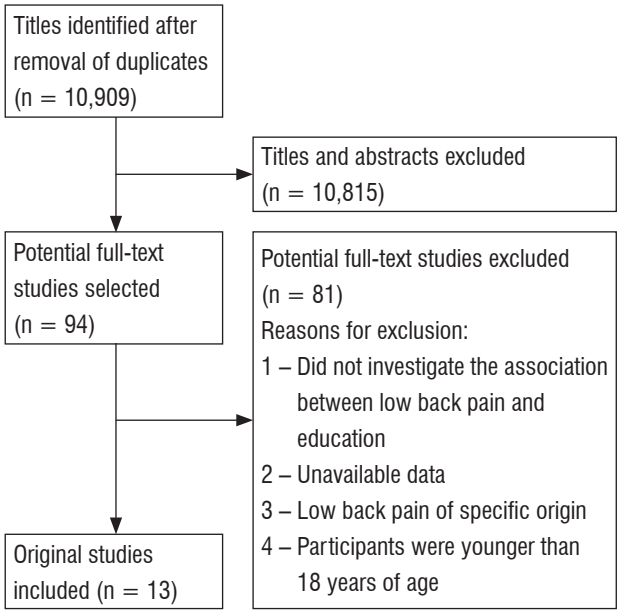

Figure 1 – Selection of studies for review.

Characteristics of the studies included

Thirteen studies from nine countries associated education with LBP and were included in the review. They all had a low risk of bias (7 or more out of 10). The studies with the smallest and the largest sample size included 34 [19] and 4,760 participants [20], respectively. Sixty-two percent of the studies included in the review were cross-sectional (Table 1). We found a predominance of people in the economically active age-group, i.e., aged 25-55 years [3, 19-24]. One study associated LBP with education in non-institutionalized older adults [25] and three studies included older adults in their samples [21, 26, 27].

Two papers had been published in the USA [20, 21], two in Germany [26, 27], two in the Netherlands [23, 28] and two in Belgium [29, 30]. The review also included studies published in Japan, Hong Kong, Brazil, Sweden and South Korea.

Table 1 - Characteristics of the studies included (n = 13)

First author, year, country	Study design	Subjects (n)	Prevalence of LBP according to education level attained % (n of cases / total n)	
Nagi (1973) USA	Cross-sectional	People aged 18-64 years living in a metropolitan city.	Low Medium High	29.50% (36/122) 44.25% (127/287) 11.81% (39/330)
Lee (1989) Hong Kong	Longitudinal	Patients from the University of Hong Kong, who had spinal pain	Low	62.98%(34/54)
Hurwitz (1997) USA	Cross-sectional	Non-institutionalized civil population aged 18 years or older.	Low Medium High	8.03% (621/7728) 6.81% (726/10,659) 5.30% (3,413/64,314)
Muramatsu (1997) Japan	Cross-sectional	Non-institutionalized individuals aged 60 years or older.	Low	17.99% (371/2062)
Miedema (1998) Netherlands *	Longitudinal	Dutchmen who sought medical care for musculoskeletal disorders.	Low Medium High	30.83% (70/227) 28.65% (47/164) 17.07% (7/41)
Latza (2000) Germany **	Cross-sectional	German population aged 25-74 years living in *Lübeck*	Low Medium High	50.63% (239/472) 76.01% (168/221) 79.31% (46/58)
Goubert (2003) Belgium ***	Cross-sectional	Bicultural subjects in Belgium.	Low High	44.32% (43/97) 41.66% (632/1,517)
Silva (2004) Brazil	Cross-sectional	Brazilians living in Southern Brazil.	Low Medium High	5.28% (103/1,949) 2.81% (22/781) 1.99% (9/452)
Clays (2007) Belgium	Longitudinal	Public administration, private company and bank workers aged 45 years or older.	Low Medium High	50.30% (488/970) 42.55% (346/813) 31.84% (236/741)

(To be continued)

(Conclusion)

Table 1 - Characteristics of the studies included (n = 13)

First author, year, country	Study design	Subjects (n)	Prevalence of LBP according to education level attained % (n of cases / total n)	
Schneider (2007) Germany ****	Longitudinal	Subjects fluent in German.	Low	38.89% (431/1,108)
			Medium	36.02% (1,702/4,725)
			High	28.00% (266/950)
Dijken (2008) Sweden	Cross-sectional	Population aged 25-79 years recruited in Northern Sweden.	Low	33.91% (391/1,153)
			Medium	43.80% (1,124/2,566)
			High	41.64% (862/2,070)
Oostrom (2011) Netherlands *****	Longitudinal	Adult Dutch population.	Low	7.19% (212/2,948)
			Medium	3.86% (60/1,552)
			High	4.22% (51/1,206)
Shim (2014) South Korea	Cross-sectional	Male South Koreans aged 19 years or older.	Medium	69.07%.(755/1093)
			High	66.94% (879/1,313)

Methodological quality of the studies included for review

The reviewers used the PCAI to assess the methodological quality of the studies included in the review. The highest and the lowest scores obtained were 7 and 10, respectively. Three studies were scored as 7, three were scored as 8, three were scored as 9 and four were scored as 10. A detailed view of the scores on the PCAI, the study authors and the year of publication are shown in Table 2.

Table 2 - Methodological quality of the studies included (n = 13)

Study \ Item	1	2	3	4	5	6	7	8	9	10	Total Score (from 0 to 10)
Nagi (1973)	Y	UC	N	Y	Y	N	Y	Y	Y	Y	7
Lee (1989)	N	Y	N	Y	Y	Y	Y	N	Y	Y	7
Hurwitz (1997)	Y	Y	Y	N	Y	Y	N	Y	Y	Y	8
Muramatsu (1997)	Y	Y	Y	Y	Y	N	Y	Y	Y	N	8
Miedema (1998)	Y	Y	N	Y	Y	Y	Y	N	Y	Y	8
Latza (2000)	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	9
Goubert (2003)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10
Silva (2004)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10
Clays (2007)	Y	Y	UC	Y	Y	Y	Y	Y	Y	Y	9
Schneider (2007)	Y	Y	Y	Y	Y	N	Y	N	Y	N	7
Dijken (2008)	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	9
Oostrom (2011)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10
Shim (2014)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10

Note: Y = yes; N = no; UC = unclear.

Association between educational level and prevalence of low back pain at the time of assessment

Meta-analysis using a random-effects model and including all educational levels found a weighted prevalence of LBP at the time of assessment of 23% (95% CI, 13-37), from 10,582 cases out of a total of 99,457 (Figure 2). A random-effects model was used due to heterogeneity above 50%. Whereas 99% heterogeneity was observed when using the fixed-effect model, 0% heterogeneity was found when using the random-effects model.

Studies	Prevalence	Total	95%	CI	Weight
Nagi (1973) L	0.30	36 / 122	0.22	0.38	5.21
Lee (1989) L	0.63	34 / 54	0.49	0.75	5.12
Hurwitz (1997) L	0.08	621 / 7728	0.07	0.09	5.31
Muramatsu (1997) L	0.18	371 / 2062	0.16	0.20	5.30
Silva (2004) L	0.05	103 / 1949	0.04	0.06	5.28
Clays (2007) L	0.50	488 / 970	0.47	0.53	5.30
Dijken (2008) L	0.34	391 / 1153	0.31	0.37	5.30
Nagi (1973) M	0.44	127 / 287	0.39	0.50	5.28
Hurwitz (1997) M	0.07	726 / 10659	0.06	0.07	5.31
Silva (2004) M	0.03	22 / 781	0.02	0.04	5.20
Clays (2007) M	0.43	346 / 813	0.39	0.46	5.30
Dijken (2008) M	0.44	1124 / 2566	0.42	0.46	5.31
Shim (2014) M	0.69	755 / 1093	0.66	0.72	5.30
Nagi (1973) H	0.12	39 / 330	0.09	0.16	5.24
Hurwitz (1997) H	0.05	3413 / 64314	0.05	0.05	5.31
Silva (2004) H	0.02	9 / 452	0.01	0.04	5.04
Clays (2007) H	0.32	236 / 741	0.29	0.35	5.29
Dijken (2008) H	0.42	862 / 2070	0.40	0.44	5.31
Shim (2014) H	0.67	879 / 1313	0.64	0.69	5.30
Pooling	0.23	10582 / 99457	0.13	0.37	100.00

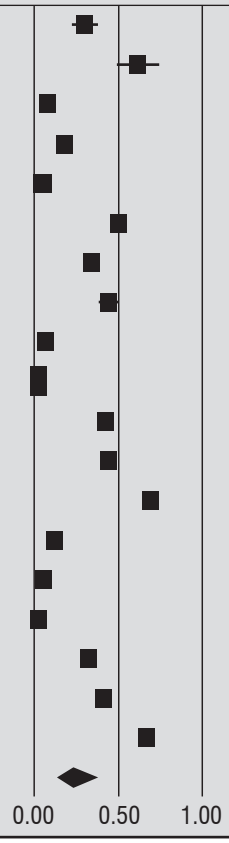

Figure 2 - Meta-analysis of prevalence of low back pain at the time of assessment in all education groups.
Note: educational levels, L = low; M = medium; and H = high.

The meta-analysis of studies on the prevalence of LBP at the time of assessment in people with low educational level found a weighted prevalence of 24% (95% CI, 12-43). Out of a total sample of 14,038, there were 2,044 participants with low educational level. Meta-analysis found a weighted prevalence of 27% (95% CI, 9-56) of participants with medium educational level, i.e., 3,100 out of a total sample of 16,199 participants. Meta-analysis also found a weighted prevalence of 18% (95% CI, 5-50) of participants with high educational level, i.e., 3,100 out of a total sample of 16199 participants (Figure 3).

Studies	Prevalence	Total	95%	CI	Weight
I) Meta-analysis of prevalence of LBP, by grouping studies that investigated low education levels					
Nagi (1973)	0.30	36 / 122	0.22	0.38	14.07
Lee (1989)	0.63	34 / 54	0.49	0.75	13.66
Hurwitz (1997)	0.08	621 / 7728	0.07	0.09	14.48
Muramatsu (1997)	0.18	371 / 2062	0.16	0.20	14.47
Silva (2004)	0.05	103 / 1949	0.04	0.06	14.39
Clays (2007)	0.50	488 / 970	0.47	0.53	14.46
Dijken (2008)	0.34	391 / 1153	0.31	0.37	14.46
Pooling	0.24	2044 / 14038	0.12	0.43	100.00

(To be continued)

(Conclusion)

Studies	Prevalence	Total	95%	CI	Weight
II) Meta-analysis of prevalence of LBP, by grouping studies that investigated medium education levels					
Nagi (1973)	0.44	127 / 287	0.39	0.50	16.65
Hurwitz (1997)	0.07	726 / 10659	0.06	0.07	16.74
Silva (2004)	0.03	22 / 781	0.02	0.04	16.43
Clays (2007)	0.	346 / 813	0.39	0.46	16.72
Dijken (2008)	0.44	1124 / 2566	0.42	0.46	16.74
Shim (2014)	0.69	755 / 1093	0.66	0.72	16.72
Pooling	0.27	3100 / 16199	0.09	0.56	100.00
III) Meta-analysis of prevalence of LBP, by grouping studies that investigated high education levels					
Nagi (1973)	0.12	39 / 330	0.09	0.16	16.65
Hurwitz (1997)	0.05	3413 / 64314	0.05	0.05	16.78
Silva (2004)	0.02	9 / 452	0.01	0.04	16.27
Clays (2007)	0.32	236 / 741	0.29	0.35	16.75
Dijken (2008)	0.42	862 / 2070	0.40	0.44	16.77
Shim (2014)	0.67	879 / 1313	0.64	0.69	16.77
Pooling	0.18	5438 / 69220	0.05	0.50	100.00

Figure 3 - Meta-analysis of prevalence of LBP at the time of assessment, according to educational level attained.

Association between educational level and prevalence of low back pain at other time points

Studies that did not investigate LBP at the time of assessment [23, 26, 28-31] were not included in the meta-analysis. Qualitative analysis was conducted to investigate the prevalence of LBP at each time point studied and for each educational level. Two studies investigated the prevalence of LBP in the last twelve months [28, 31] in low, medium and high educational levels. The prevalence of low, medium and high educational levels, respectively, was: 30.8%, 28.7% and 17.1% [28]; and 38.9%, 36.0%, 28% [31]. One study investigated the prevalence of LBP in the last six months [29] in high and low educational levels. The prevalence of low and high educational levels, respectively, were 44.3% and 41.7%. One study investigated the prevalence of LBP in the last ten years in low, medium and high educational levels [23]. The prevalence of low, medium and high educational levels, respectively, was 7.2%, 3.9% and 4.2%.

Meta-regression to investigate whether educational level impacts prevalence of low back pain

The use of meta-regression to investigate whether educational level could explain heterogeneity in LBP prevalence was only possible for studies that reported prevalence at the time of assessment. This is because only a small number of studies reported prevalence of LBP at other time points. The educational level attained explained the 99% heterogeneity found in the meta-analysis on LBP prevalence at the time of assessment in all educational levels grouped together ($p < 0.05$).

Discussion

This systematic review aimed to investigate the association between educational level and the occurrence of LBP. Our findings suggest that, in a heterogenous sample for prevalence of LBP in all educational levels grouped together, people who attained higher educational levels show lower prevalence rates than people with low or medium educational levels.

These findings corroborate those of a systematic review by Dionne [15], demonstrating that individuals with less years of education are more susceptible to LBP and disability. They are also in line with the results found by Meucci [32], who found that, just like smoking and low economic status, low educational level is associated with an increased prevalence of LBP. In addition, when compared with previous

reviews, the current review included newer studies and its meta-analysis on the prevalence of LBP in different educational levels was larger and more accurate. Moreover, meta-regression indicated that educational level is an important risk factor for the occurrence of LBP ($p < 0.05$).

Our results suggest an important clinical implication. If educational level influences the occurrence of LBP, educational level may be an important psychosocial factor to be used in preventive and treatment approaches for LBP. Low and medium educational levels may be seen as risk and/or prognostic factors. Individual and group educational approaches should stress the importance of spine care and other factors that may influence the occurrence of LBP.

A cohort study by Mustard [33] found low educational level to be a risk factor for LBP (Odds Ratio: 1.8; 95% CI, 1.2-2.7) and parental educational level to be a risk factor for LBP in children (Odds Ratio: 2.0; 95% CI, 1.3 - 3.1). Thus, in addition to the individual consequences of LBP, parental educational level also seems to affect the occurrence LBP in children and adolescents.

It is possible that people's adherence to risky behaviors is greater in people with lower educational levels. One possible cause for the higher prevalence of LBP among people with medium and low educational levels could be that these people are exposed to different workloads and work activities than people with high educational levels [34-38].

Linton [39] analyzed psychological factors for the occurrence of LBP and reported that a confounding variable was the sample's educational level. Thus, education might not only be associated with the occurrence of LBP. If left unchecked, it could also produce information bias. Consequently, even in studies whose primary aim is not to investigate the prevalence of LBP, checking the education variable could possibly explain the results obtained. Thus, we found that educational level attained or number of years of education is a variable that is frequently used to characterize study samples, although this was not a primary aim in our searches. Studies with other aims have also described associations with education [40-48]. Studies assessing the prevalence of LBP reported associations with educational level, even though this was not their primary search goal [49-58]. Further studies having as their primary aim the investigation of the association of educational level attained or number of years of education with other variables are therefore needed to increase the number of studies eligible for meta-analysis that correlate education with the occurrence of LBP.

The small number of studies found for this review and the matching of these studies using the Brazilian education model may be one limitation of this review. We found 13 studies conducted in nine countries with different cultural, socioeconomic backgrounds. Because the formal education categories used in the studies included in this review were not consistent with each other, we had to recode the educational level variables based on Brazilian education classification criteria. This allowed the summary of the data. We suggest that future studies use years of formal education to facilitate the understanding of the role played by education in the occurrence of LBP. Possible limitations of this study include the lack of recording of the protocol used in the studies and the non-use of the GRADE approach [59] to assess evidence quality, as suggested by PRISMA [60]. There were no limitations regarding the methodological quality of the studies included for review, as all the studies included had a score of 7 or more out of a maximum of 10 points on the scale.

Conclusion

Occurrence of LBP varies according to educational level. Individuals with higher educational levels are less often affected by LBP than individuals with medium or low educational levels.

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