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

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

Alexandre Apolinário de Souza Batista[a], Nicholas Henschke[b], Vinícius Cunha Oliveira[a]*

[a] Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil
[b] Institute of Public Health of Heidelberg (HIPH), Heidelberg, Germany

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 PsycINFO. **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.
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.

Prevalence of low back pain in different educational levels

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. I² statistics [18] was used to determine the possibility of performing meta-analysis. Whenever I² < 50%, meta-analysis was conducted using a fixed-effect model, whereas a random-effects model was used when I² ≥ 50%. If even after using a random-effects model, I² ≥ 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.

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

<table>
<thead>
<tr>
<th>First author, year, country</th>
<th>Study design</th>
<th>Subjects (n)</th>
<th>Prevalence of LBP according to education level attained % (n of cases / total n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nagi (1973) USA</td>
<td>Cross-sectional</td>
<td>People aged 18-64 years living in a metropolitan city.</td>
<td>Low 29.50% (36/122)</td>
</tr>
<tr>
<td>Lee (1989) Hong Kong</td>
<td>Longitudinal</td>
<td>Patients from the University of Hong Kong who had spinal pain</td>
<td>Low 62.98% (34/54)</td>
</tr>
<tr>
<td>Hurwitz (1997) USA</td>
<td>Cross-sectional</td>
<td>Non-institutionalized civil population aged 18 years or older.</td>
<td>Low 8.03% (621/7728)</td>
</tr>
<tr>
<td>Muramatsu (1997) Japan</td>
<td>Cross-sectional</td>
<td>Non-institutionalized individuals aged 60 years or older.</td>
<td>Low 17.99% (371/2062)</td>
</tr>
<tr>
<td>Miedema (1998) Netherlands *</td>
<td>Longitudinal</td>
<td>Dutchmen who sought medical care for musculoskeletal disorders.</td>
<td>Low 30.83% (70/227)</td>
</tr>
<tr>
<td>Latza (2000) Germany **</td>
<td>Cross-sectional</td>
<td>German population aged 25-74 years living in Lübeck</td>
<td>Medium 76.01% (168/221)</td>
</tr>
<tr>
<td>Goubert (2003) Belgium ***</td>
<td>Cross-sectional</td>
<td>Bicultural subjects in Belgium.</td>
<td>Low 44.32% (43/97)</td>
</tr>
<tr>
<td>Silva (2004) Brazil</td>
<td>Cross-sectional</td>
<td>Brazilians living in Southern Brazil.</td>
<td>Low 2.81% (22/781)</td>
</tr>
<tr>
<td>Clays (2007) Belgium</td>
<td>Longitudinal</td>
<td>Public administration, private company and bank workers aged 45 years or older.</td>
<td>Low 42.55% (346/813)</td>
</tr>
</tbody>
</table>

(To be continued)
Prevalence of low back pain in different educational levels

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

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

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)

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

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.
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., 3,110 out of a total sample of 16199 participants (Figure 3).
Prevalence of low back pain in different educational levels

Studies

Table

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

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.

**References**


12. Pincus T, Callahan LF, Burkhauser RV. Most chronic diseases are reported more frequently by individuals with fewer than 12 years of formal education in the age 18-64 United States population. J Chronic Dis. 1987;40(9):865-74.


42. Croft PR, Rigby AS. Socioeconomic influences on back problems in the community in Britain. J Epidemiol Community Health. 1994;48(2):166-70.


Received on 05/05/2016
Recebido em 05/05/2016

Approved on 04/10/2017
Aprovado em 10/04/2017