# Low back pain prevalence in Brazil: a systematic review

## Prevalência da dor lombar no Brasil: uma revisão sistemática

## La prevalencia de dolor lumbar en Brasil: una revisión sistemática

*Paulo Roberto Carvalho do Nascimento* [1]
*Leonardo Oliveira Pena Costa* [1]

**Abstract**

*The article describes the methodological quality of published studies on prevalence of low back pain in Brazil. Eighteen studies were considered eligible after searches in the following electronic databases: LILACS, PubMed, Embase, CINAHL, SPORTDiscus and SciELO. A high source of bias was observed in the criteria for external validity related to sampling, in addition to non-response bias. Considering the criteria for internal validity, the main sources of bias were the lack of an acceptable definition of low back pain and the use of instruments that lacked proven reliability and validity. No representative study was found that provides a generalizable prevalence of low back pain in Brazil. The published studies included in this review showed a high risk of bias that affects the prevalence data. Future studies with appropriate methodological design are necessary to verify the real impact of low back pain in Brazil and allow comparisons.*

*Low Back Pain; Bias (Epidemiology); Review*

**Resumo**

*O artigo descreve a qualidade metodológica dos estudos publicados sobre prevalência de dor lombar realizados no Brasil. Dezoito estudos foram considerados elegíveis após pesquisas nas seguintes bases de dados: LILACS, PubMed, Embase, CINAHL, SPORTDiscus e SciELO. Alto risco de viés foi encontrado nos critérios de validade externa relacionados com a amostragem, e viés de não-resposta. Considerando os critérios de validade interna, a principal fonte de viés estava relacionada com a falta de uma definição de caso aceitável, bem como a utilização de instrumentos que não apresentavam construto de confiabilidade e a validade provados. Nenhum estudo representativo com valores de prevalência da dor lombar no Brasil foi encontrado. Os trabalhos publicados incluídos nesta revisão apresentaram um alto risco de viés que afetam os dados de prevalência. Futuros estudos com desenho metodológico adequado são necessários, a fim de apresentar o real impacto da dor lombar no Brasil e permitir comparações.*

*Dor Lombar; Viés (Epidemiologia); Revisão*

[1] *Universidade Cidade de São Paulo, São Paulo, Brasil.*

**Correspondence**
*P. R. C. Nascimento*
*Universidade Cidade de São Paulo.*
*Rua Cesáreo Galeno 448, São Paulo, SP 03071-000, Brasil.*
*prcnascimento@yahoo.com.br*

## Introduction

Low back pain can affect up to 65% of the population per year and up to 84% during life span [1], with a point prevalence of approximately 11.9% in the world population [2], which overloads all health services [3]. However, these rates may be underestimated, since less than 60% of people with low back pain actually seek treatment [4]. Despite these numbers, a specific diagnosis presenting the causes of low back pain is not determined in 90-95% of the cases [5], since low back pain has a multifactorial etiology [6]. Some authors [7,8] relate the presence of low back pain to a set of causes, including social and demographic factors (such as age, gender, income, and schooling), health status, lifestyle or behavior factors (smoking, eating, and sedentary lifestyle), and occupation factors (such as heavy loadings and repetitive movements). However, a systematic review conducted by Vollin [9] found that in the developed countries, where the physical demand of work tends to be less intense, prevalence of low back pain is twice as high as in low-income countries, where the physical demand of work is higher. Based on the findings of this study, sedentary lifestyle seems to have a greater impact on the occurrence of low back pain when compared to intense physical work.

Since low back pain is responsible for high rates of disability and work absenteeism. This condition imposes a high cost on the society, especially in developed countries [10,11,12]. Various studies [13,14,15,16,17,18,19] in recent years have attempted to understand more about low back pain and how to manage it. However, precise estimates of low back pain prevalence are necessary to elucidate the developmental perspective of low back pain in different countries [20]. Prevalence studies are widely used in epidemiology due their economic feasibility and easiness, with relatively short duration, providing indicators of the community's health situation, based on evaluation of the individual health status in each member of the group and producing global health indicators for the target group [21].

According to the *Brazilian National Household Sample Survey* conducted by the Brazilian Institute of Geography and Statistics [22], spinal pain (cervical, thoracic, lumbar, and pelvic pain) is the second most prevalent health condition in Brazil (13.5%) among the chronic conditions identified by a physician or other health professional. Spinal pain is overcomed only by hypertension (14%). However, this survey does not report specific prevalence rates for low back pain, which has different clinical manifestations and prognosis [23] when compared to cervical [24], thoracic [25], and pelvic pain [26,27]. The Brazilian population profile changed in recent years as the population is getting older, now representing 7.4% of Brazilians [28], an increase in sedentary habits among adults [29], resulting in body composition alterations, increasing rates of overweight and obesity, which currently affect 58.4% and 52.5% of Brazilian women and men, respectively [30]. Since these changes are risk factors for low back pain [2,31], knowledge of current prevalence of low back pain in Brazil is important to determine reference values for future comparisons, thereby verifying the impact of such changes on low back pain prevalence.

Data on prevalence of low back pain in Brazil have been obtained from studies in diverse segments of the Brazilian population, but to our knowledge there is no systematic review available on this topic. Therefore, information about the prevalence of low back pain in the Brazilian population is an important step to reveal the scope and extent of its effects, providing direction for preventive and intervention strategies [32]. Thus, the current study aimed to systematically review and to analyze the quality of the existing literature on LBP prevalence in Brazil.

## Methods

### Eligibility criteria

The study included all indexed articles in any language that reported data on the prevalence of low back pain in the overall Brazilian population or in specific categories (e.g., truck drivers, nurses, etc.), regardless of the definition of low back pain used by the authors, data collection instruments used, date of publication, age, or gender. Articles reporting prevalence of low back pain in pregnant women were excluded.

### Search strategy

Electronic systematic searches on LILACS, PubMed, Embase, CINAHL, SPORTDiscus, and SciELO were conducted using specific search strategies (Table 1). The latest search was performed in May 2013. Articles were selected by two independent examiners (L.O.P.C. and P.R.C.N.) by reading the title or abstract. The potentially eligible articles were fully read. We also checked the reference lists from all eligible articles in order to retrieve new references for this review.

Table 1

Search strategy in the LILACS, SciELO, PubMed, Embase, CINAHL, and SPORTDiscus databases.

| | Search strategy |
|---|---|
| LILACS | (mh:(lumbar pain)) OR (back pain) OR (sciatica OR lumbago ) AND (prevalence OR incidence OR cross-sectional studies OR epidemiology OR survey OR frequency OR morbidity OR occurrence) AND (Brazil OR Brazilian) |
| SciELO | lumbar pain OR back pain OR sciatica OR lumbago [all the indexes] AND prevalence OR incidence OR epidemiology OR frequency OR occurrence [all the indexes] AND Brazil OR brasi$ [all the indexes] |
| PubMed | (((low back pain OR low back ache OR low backache OR lumbago OR lower back pain OR lumbar spine pain[Title/Abstract])) AND (epidemiology OR frequency OR surveillance OR morbidity OR occurrence OR prevalence OR incidence[Title/Abstract])) AND (Brazil OR Brazi*[Title/Abstract]) |
| Embase | low AND 'back'/exp AND 'pain'/exp OR 'backache'/exp OR 'discogenic pain'/exp OR 'sciatica'/exp AND 'prevalence'/exp AND 'Brazil'/exp |
| CINAHL | ( (MH "Back Pain") OR (MM "Low Back Pain/EP/HI/FG/PC/PR/RF/SS") OR (MH "Sciatica") OR "lumbago" ) )AND ( (MH "Cross Sectional Studies") OR (MH "Prevalence") OR "prevalence" OR (MH "Incidence") OR (MH "Epidemiology") ) AND ( (MH "Brazil") OR (MH "Brazilian") ) |
| SPORTDiscus | ( (((DE "BACKACHE")) OR (DE "SCIATICA")) OR (DE "SPINE" OR DE "BACK") ) AND ( (DE "DISEASE prevalence") OR (DE "EPIDEMIOLOGY" OR DE "PUBLIC health" OR DE "EPIDEMICS") ) AND ( ( Brazil OR Brazilian OR Brazilians ) ) |

### Risk of bias of individual studies

Considering that selected studies could present potential sources of bias and influence the results, the instrument developed by Hoy et al. [33] (Table 2) was used to assess the risk of bias of the eligible studies. This instrument allows verifying the risk of bias for factors related to external and internal validity, allowing classification of the risk of bias as low, moderate, or high. This instrument was chosen mainly because it is easy to use, shows high inter-examiner agreement, and it was developed specifically to measure the risk of bias in prevalence studies for patients with low back pain [33].

Risk of bias was analyzed by two independent reviewers (L.O.P.C. and P.R.C.N.) and based on the following: (1) representativeness of the study sample in relation to the Brazilian national population, allowing generalization of the results; (2) sampling system that represents the target population; (3) sample selection method; (4) probability of non-response bias; (5) how the target response was obtained; (6) definition of low back pain used for the sample selection; (7) reliability and validity of the study tools; (8) standardization of data collection; (9) appropriate target prevalence period; and (10) presence of error in calculating and/or reporting the numerator and denominator of the target parameter. The first four criteria relate to the study's external validity, and the other items report the risk of bias for internal validity. At the end, the studies were classified as presenting low risk of bias when at least nine criteria were met, moderate risk of bias for studies that met seven or eight criteria, and high risk of bias when the studies met less than seven criteria. The reviewers discussed the cases in which there was no agreement and classification was determined by consensus. The levels of agreement between reviewers were not measured in this study. Table 2 presents the operationalization of each item.

### Data extraction and statistical analysis

The target variables (first author, year of publication, type of study, data collection tool, sample size, population, age, gender, definition of low back pain, period of prevalence, and prevalence estimates) were extracted by one of the authors to an Excel spreadsheet (Microsoft Corp., USA) (Table 3). The target data were presented descriptively. Due to the high heterogeneity among the eligible studies, it was not possible to conduct a meta-analysis.

## Results

The search strategy retrieved 263 articles, 63 of which were duplicates. After the screening process (titles, abstracts, and full text reading), 18 studies [34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51] (with a population of 19,387 individuals and samples varying from 56 to 3,269 participants [34,39]) met the inclusion criteria. Figure 1 shows flow diagram of this review.

Table 2

Evaluation of risk of bias.

| Risk of bias | Criterion for response (please circle one choice) |
|---|---|
| External validity | |
| 1) Was the study's target population a close representation of the national population in relation to the relevant variables, for example age, gender, and occupation? | • Yes (LOW RISK): The study's target population was a close representation of the national population.<br>• No (HIGH RISK): The study's target population was not clearly representative of the national population. |
| 2) Was the sampling system a true or close representation of the target population? | • Yes (LOW RISK): The sampling system was a true or close representation of the target population.<br>• No (HIGH RISK): The sampling system was not a true or close representation of the target population. |
| 3) Was some form of random selection used to select the sample or was a census performed? | • Yes (LOW RISK): A census was performed or some form of random selection was used to select the sample (for example, simple random sampling, stratified random sampling, cluster sampling, systematic sampling).<br>• No (HIGH RISK): No census was performed and no form of random selection was used to select the sample. |
| 4) Was the probability of non-response bias minimal? | • Yes (LOW RISK): The response rate for the study was ≥ 75%, that is, an analysis was performed that showed no significant difference in relevant demographic characteristics between responders and non-responders.<br>• No (HIGH RISK): The response rate was < 75%, and if any analysis was performed to compare responders and non-responders, it showed a significant difference between them in relevant demographic characteristics. |
| Internal validity | |
| 5) Were the data collected directly from the individuals (rather than from a proxy)? | • Yes (LOW RISK): All the data were collected directly from the individuals.<br>• No (HIGH RISK): In some cases the data were collected from a proxy. |
| 6) Did the study use an acceptable case definition? | • Yes (LOW RISK): The study used an acceptable case definition.<br>• No (HIGH RISK): The study did not use an acceptable case definition. |
| 7) Did the study instrument that measures the target parameter (for example, prevalence of low back pain) demonstrate reliability and validity (if necessary)? | • Yes (LOW RISK): The study instrument demonstrated reliability and validity (if necessary), for example, test-retest, pilot, validation by a previous study, etc.<br>• No (HIGH RISK): Reliability and validity were not demonstrated for the instrument (if they were necessary). |
| 8) Was the same data collection model used for all the study subjects? | • Yes (LOW RISK): The same data collection model was used for all the individuals.<br>• No (HIGH RISK): The same data collection model was not used for all the individuals. |
| 9) Was the duration of the shortest prevalence period appropriate for the target parameter? | • Yes (LOW RISK): The duration of the shortest prevalence period was appropriate for the target parameter (for example, point prevalence, one week, one year).<br>• No (HIGH RISK): The duration of the shortest prevalence period was not appropriate for the target parameter (for example, lifetime prevalence). |
| 10) Were the numerator and denominator for the target parameter appropriate? | • Yes (LOW RISK): The study used an appropriate numerator and denominator for the target parameter (for example, prevalence of low back pain).<br>• No (HIGH RISK): The study used a numerator and denominator for the target parameter, but one or both of them was inappropriate. |

(continues)

Table 2 (continued)

| Risk of bias | Criterion for response (please circle one choice) |
|---|---|
| Internal validity | |
| 11) Summary of overall risk of bias in the study | • **LOW RISK OF BIAS**: Further research is highly unlikely to change our confidence in the estimate.<br>• **MODERATE RISK OF BIAS**: Further research is likely to have an imporant impact on our confidence in the estimate and may change it.<br>• **HIGH RISK OF BIAS**: Further research is highly likely to have an imporant impact on our confidence in the estimate and is likely to change it. |

Adapted from Hoy et al. [2].

Table 3

Prevalence rate of low back pain in the Brazilian population.

| Author/ Year | Study design | Data collection tool | Sample size (N) | Population | Mean age (years) | Gender | Definition of low back pain | Prevalence period | Prevalence |
|---|---|---|---|---|---|---|---|---|---|
| Araújo & Alexandre [34] (1998) | Cross-sectional | Original questionnaire | 56 | Surgical center nursing team at a University Hospital in Campinas (São Paulo State) | 40 | 100% females | Not informed | 6 months | 34.1% |
| Célia & Alexandre [35] (2003) | Cross-sectional | Adapted Nordic questionnaire | 61 | Workers involved in patient transport in Campinas (São Paulo State) | 41.2 | 54.1% males | Not informed | 7 days<br>1 year | 11.5%<br>59% |
| Gurgueira et al. [36] (2003) | Cross-sectional | Adapted Nordic questionnaire | 105 | Nursing staff in Campinas (São Paulo State) | 36.5 | 100% females | Not informed | 7 days<br>1 year | 31.4%<br>59% |
| Peres [37] (2004) | Cross-sectional | Original questionnaire/Body discomfort map | 156 | Physical therapists in Cascavel (Paraná State) | Not informed | Not informed | Not informed | Not specified | 33.97% |
| Silva et al. [38] (2004) | Cross-sectional | Adapted Nordic questionnaire | 3,182 | Adults ≥ 20 years, residing in Pelotas (Rio Grande do Sul State) | 44 | 56.8% females | Not informed | Chronic, > 7 weeks | 4.2% |
| Fassa et al. [39] (2005) | Cross-sectional | Nordic questionnaire | 3,269 | Children 10-17 years of age in Pelotas (Rio Grande do Sul State) | 13 | 50% males | Not informed | 1 year | 13.1% |
| Andrusaitis et al. [40] (2006) | Cross-sectional | Original questionnaire | 410 | Truck drivers in São Paulo State | 40.17 | 100% males | Pain between lower ribs and gluteal fold, not related to injuries or falls | Not specified | 59% |

(continues)

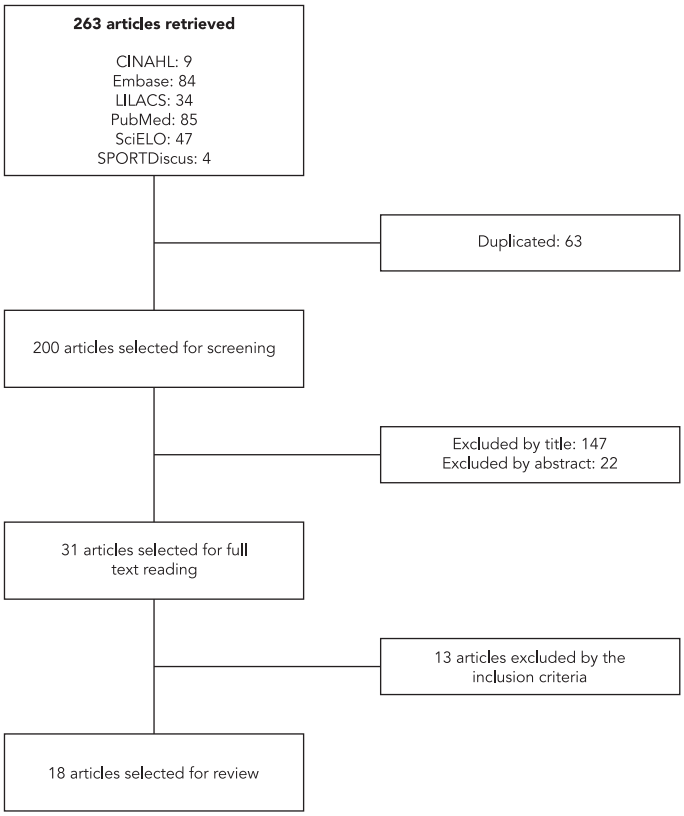
Table 3

Prevalence rate of low back pain in the Brazilian population.

| Author/ Year | Study design | Data collection tool | Sample size (N) | Population | Mean age (years) | Gender | Definition of low back pain | Prevalence period | Prevalence |
|---|---|---|---|---|---|---|---|---|---|
| Kreling et al. [41] (2006) | Cross-sectional | Original questionnaire | 505 | Employees of the State University in Londrina (Paraná State) | Not informed | 54.1% females | Not informed | Not specified | 19.4% |
| Almeida et al. [42] (2008) | Cross-sectional | Original questionnaire | 2,281 | Adults ≥ 20 year residing in Salvador (Bahia State) | 40.9 | 55.5% females | Not informed | Chronic, ≥ 6 months | 14.7% |
| Matos et al. [43] (2008) | Cross-sectional | Nordic questionnaire | 775 | Adults ≥ 20 years, members of an employees' cooperative at University of Vale do Rio dos Sinos | Not informed | 54.2% females | Not informed | 3 months<br>1 year<br>Chronic, > 6 weeks | 46%<br>52.8%<br>3.8% |
| Motta et al. [44] (2010) | Cross-sectional | Original questionnaire | 150 | Rural workers ≥ 20 years from 7 communities in Concórdia (Santa Catarina State) | 40.41 | 100% females | Not informed | Lifetime | 93.3% |
| de Vitta et al. [45] (2011) | Cross-sectional | Nordic questionnaire | 1,236 | Children 11 to 15 years of age in the municipal school system in Bauru (São Paulo State) | Not informed | 51.78% females | Pain or discomfort in the previous 12 months, not related to injury or menstrual colic | 1 year | 19.5% |
| Falavigna et al. [46] (2011) | Cross-sectional | Original questionnaire | 416 | Physical therapy and medical students at the University of Caxias do Sul (Rio Grande do Sul State) | 21.68 | 73.1% females | Pain in the area below the ribs and above the hips | Point<br>1 year<br>Lifetime | 14.4%<br>66.8%<br>77.9% |
| Fernandes et al. [47] (2011) | Cross-sectional | Nordic questionnaire | 577 | Plastics factory workers in Salvador (Bahia State) | Not informed | 69% males | Not informed | 1 year | 28.9% |
| Ferreira et al. [48] (2011) | Cross-sectional | Nordic questionnaire | 972 | Adults ≥ 20 years, residing in the urban area of Pelotas (Rio Grande do Sul State) | 41 | 57% females | Not informed | 1 year | 40% |
| Onofrio et al. [49] (2012) | Cross-sectional | Original questionnaire | 1,233 | Students 13 to 19 years of age in Pelotas (Rio Grande do Sul State) | 15.9 | 54% females | Not informed | 1 month | 13.7% |
| Dellaroza et al. [50] (2013) | Cross-sectional | Original questionnaire | 1,271 | Elderly residing in São Paulo (São Paulo State) | 69.5 | 59.6% females | Not informed | Chronic, ≥ 6 months | 25.4% |
| Meucci et al. [51] (2013) | Cross-sectional | Adapted Nordic questionnaire | 2,732 | Adults > 20 years, residing in Pelotas (Rio Grande do Sul State) | Not informed | 57.9% females | Not informed | Chronic, > 7 weeks | 9.6% |

Figure 1

Flowchart of inclusion process of articles in the systematic review.




The eligible studies showed the recent interest in prevalence of low back pain in the Brazilian population, with the first article published in 1998 [34] and the remaining ones were published over the last 10 years. Most of the studies included males and females, ranging from children [39] to the elderly [50], with populations residing in urban and rural areas [44], but none showed separate prevalence values according to gender. Three studies [34,36,44] reported on the prevalence of low back pain exclusively in women, two of which presenting the rates observed in female urban workers [34,36] and one in female farm laborers [44], but the different prevalence periods prevented any comparison. The principal research design was cross-sectional. Data collection used original questionnaires in 50% of the studies [34,37,40,41,42,44,46,49,50], while the Nordic questionnaire [52] was used in the remaining studies [35,36,38,39,43,45,47,48,51]. In most of the studies, prevalence of low back pain was verified in specific groups of workers or in students. Chronic low back pain was more prevalent in the population in Salvador, in Northeast Brazil [42] (14.7%), than in Pelotas in the South [38,51] (4.2% and 9.6%). Three studies only presented clear definitions of low back pain [40,45,46], nevertheless using different concepts. No study in this review reported the minimum duration of pain in order to be considerate as an episode of low back pain. The most common prevalence estimates were one year prevalence, seven days prevalence. The high heterogeneity of eligible studies also prevented a summary prevalence rate over time in most of the periods analyzed, and it was only possible to verify the one-year prevalence of low back pain, reaching more than 50% of adults [35,36,43] and 13.1% to 19.5% of adolescents [39,45], whereas chronic low back pain affected between 4.2% and 14.7% of the overall population [38,42].

The risk of bias in the eligible studies ranged from 4 [37,44] to 8 [38,39,51] of a 10 possible points. Classification of the overall risk of bias showed

that 11 studies [34,35,36,37,40,42,43,44,47,49,50] presented high risk of bias, while seven studies [38,39,41,45,46,48,51] had moderate risk of bias. Greater risk of bias was found in the criteria related to external validity: representativeness of Brazilian national population (18 studies), sampling system (15 studies), sample selection method (12 studies), and non-response bias (5 studies). The items referring to internal validity: definition of low back pain, and realibility and validity of the study tools were not completed in 15 [34,35,36,37,38,39,41,42,43,44,47,48,49,50,51] and 8 [34,37,41,42,44,46,49,50] of the studies, respectively. Table 4 shows the criteria for evaluating risk of bias in each study.

## Discussion

This review systematically evaluated and analyzed the methodological quality of the existing literature reporting data on the prevalence of low back pain in the Brazilian population. To our knowledge, this is the first systematic review on the prevalence of low back pain in Brazil. Our review showed the recent interest in the epidemiology of low back pain in Brazil, with most of the studies published over the last ten years.

The recent interest in researching the prevalence of low back pain in the Brazilian population may reflect the rising financial costs for health services and the social security system in recent years [53]. Likewise, studies on the prevalence of low back pain in Africa [54] and the occurrence of global low back pain [1] also reflect the recent interest on this topic.

The most interesting result of the current review is the higher prevalence of chronic low back pain in the city of Salvador [42] (14.7%) when compared to the city of Pelotas, as reported in two studies [38,51], estimated at 4.2% and 9.6%. The study population in Salvador presented some different characteristics, for example more non-white individuals (70.2%), lower social class (55.2%), low schooling (42.6%), obesity (50.4%), and sedentary lifestyle (71.5%) when compared to the Pelotas sample, and these differences may have contributed to the higher prevalence of low back pain observed in Salvador [49,55,56,57,58,59,60]. However, we believe that the main determinant of the difference in prevalence rates was the studies' lack of methodological rigor. The two studies in Pelotas showed a moderate overall risk of bias, while the study in Salvador showed a high overall risk of bias, potentially influencing the prevalence rates. Despite the high prevalence of chronic low back pain in adults in Salvador when compared to Pelotas, the rates found in Salvador were lower than the mean value (19.4%) in the world population [2]. Still, we cannot claim that the prevalence of chronic low back pain in Brazil is lower, since the rates are based only on regional data of studies with poor methodological quality. Our results revealed the heterogeneity of methods, data collection, types of study population, and results, thus preventing any significant pooling of data, the same problem reported in other reviews [1,2,54,61]. In addition, most of the studies reported prevalence rates for workers and students, as observed by Louw et al. [54]. The preference for these population groups may have been due to sample feasibility and the presence of characteristics defined as risk factors for low back pain, such as greater stress [62] and sustained postures [63,64,65]. The study of low back pain prevalence in students allows knowing the problem's size in this population group, and also establishing possible etiological factors, since according to their school grade, accelerated growth and strain in specific muscles can occur, in addition to daily habits like smoking, all known risk factors for low back pain [66,67]. Knowledge of modifiable risk factors is important to establish preventive strategies, since low back pain in adulthood is more common in individuals that already presented the symptoms during adolescence [68,69].

This review's main finding is that the studies on prevalence of low back pain in Brazilian population show significant limitations in the methodological design of aspects related to external and internal validity. Among the criteria for external validity, none of the studies presented a sample that represented Brazilian national population, while the samples consisted mainly of the population in municipalities with research centers and specific population groups. Studies with samples that represent the national population are difficult, since they require a larger team and high financial cost. The solution to this problem may be multicenter studies involving research groups from different regions of the country. Only two studies [48,50] described the sample calculation in their methods. The studies that met eligible criteria in this review generally presented an insufficient sample. According to the methodological review by Loney & Stratford [70], considering the proportion of individuals that suffer from low back pain, the adequate sample size for prevalence studies on low back pain should be 1,067 participants. The sampling system was considered inadequate in eight studies [35,36,40,43,44,45,46,47], which involved only a specific subgroup of the population not described in the title (e.g., students, nurses, truck drivers, etc.). Only six studies used a proper sample selection method like a random selection [38,39,41,42,48,51]. In the others, convenience sample

Table 4

Evaluation of risk of bias in the studies.

| Author/Year | Was the study's target population a close representation of the national population? | Was the sampling system a true or close representation of the target population? | Was some form of random selection used to select the sample or was a census performed? | Was the probability of non-response bias minimal? | Were the data collected directly from the individuals? | Did the study use an acceptable case definition? | Did the study instrument measuring the target parameter show reliability and validity? | Was the same data collection model used for all the subjects? | Was the shortest prevalence period appropriate for the target parameter? | Were the numerator and denominator for the target parameter appropriate? |
|---|---|---|---|---|---|---|---|---|---|---|
| Araújo & Alexandre [34] (1998) | N | N | N | Y | Y | N | N | Y | Y | Y |
| Célia & Alexandre [35] (2003) | N | N | N | Y | Y | N | Y | Y | Y | Y |
| Gurgueira et al. [36] (2003) | N | N | N | Y | Y | N | Y | Y | Y | Y |
| Peres [37] (2004) | N | N | N | N | Y | N | N | Y | Y | Y |
| Silva et al. [38] (2004) | N | Y | Y | Y | Y | N | Y | Y | Y | Y |
| Fassa et al. [39] (2005) | N | Y | Y | Y | Y | N | Y | Y | Y | Y |
| Andrusaitis et al. [40] (2006) | N | N | N | N | Y | Y | Y | Y | Y | Y |
| Kreling et al. [41] (2006) | N | N | Y | Y | Y | N | N | Y | Y | Y |
| Almeida et al. [42] (2008) | N | Y | Y | N | Y | N | N | Y | Y | Y |
| Matos et al. [43] (2008) | N | N | N | Y | Y | N | Y | Y | Y | Y |
| Motta et al. [44] (2010) | N | N | N | N | Y | N | N | Y | Y | Y |
| de Vitta et al. [45] (2011) | N | N | N | Y | Y | Y | Y | Y | Y | Y |
| Falavigna et al. [46] (2011) | N | N | N | N | Y | Y | N | Y | Y | Y |
| Fernandes et al. [47] (2011) | N | N | N | Y | Y | N | Y | Y | Y | Y |
| Ferreira et al. [48] (2011) | N | N | Y | Y | Y | N | Y | Y | Y | Y |
| Onofrio et al. [49] (2012) | N | N | N | Y | Y | N | N | Y | Y | Y |
| Dellaroza et al. [50] (2013) | N | N | N | Y | Y | N | N | Y | Y | Y |
| Meucci et al. [51] (2013) | N | Y | Y | Y | Y | N | Y | Y | Y | Y |

N: criterion not met; Y: criterion met.

was the principal form of participant selection. Many researchers prefer this sampling technique due to its ease, speed, and low cost [71]. However, this sampling process may be biased, generating systematic error and failing to reflect the true prevalence of low back pain in the study population [71]. Ten studies showed a risk of non-response bias [37,40,42,43,44,46,47,48,49,50] by failing to report the occurrence of losses or refusals, which can generate confounding factors and prevent generalization of the results. Again, the lack of transparency on this item can lead to biased prevalence estimates.

The items referring to internal validity, definition of low back pain, and realibility and validity of study tools were not completed in 15 [34,35,36,37,38,39,41,42,43,44,47,48,49,50,51] and 8 studies [34,37,41,42,44,46,49,50], respectively. Only three studies [40,45,46] cited what they defined as low back pain, with distinct definitions: "*pain between the lower part of the ribs and the gluteal fold, not related to injuries or falls*", "*pain or discomfort in the last 12 months not related to trauma or menstrual colic*", and "*pain in the area between the ribs and the hips*". According to a consensus on low back pain in prevalence studies [72], an ideal definition of low back pain should include the site of the pain, symptoms, duration, frequency, and severity.

Data were also collected in a non standardized way, so that only half of the 18 eligible studies [35,36,38,39,43,45,47,48,51] used the *Standardized Nordic Questionnaire* as proposed previously by Lebouef-Yde & Lauritsen [73]. Similar findings came from the review published in 2000 by Walker [1]. As demonstrated in the literature, the way the questionnaire is applied and the selected tool itself influence the results of prevalence studies [74]. A systematic review by Hoy et al. [2] found that a high risk of bias for case definition and validity and reliability of the study tools was associated with results reporting higher prevalence.

Our study has some limitations. We attempted to minimize these limitations by evaluating the methodological criteria of the eligible studies, but unlike other reviews [1,2,54] we did not establish a cut-off point based on this methodological evaluation in order to include the studies in this review. This decision was due to the low number of studies that would have met the inclusion criteria considering this parameter, as well the fact that this was the first systematic review as far as we know on the prevalence of low back pain in Brazil, which helps explain these shortcomings and points to possible ways to overcome them.

Our review showed that the different studies that attempted to measure the prevalence of low back pain found a high one-year prevalence rate (> 50%) in adults, from 13.1% to 19.5% in adolescents, and prevalence rates of 4.2% to 14.7% for chronic low back pain in the general population. Due to the high risk of bias of the eligible studies, these rates may not reflect the real impact of low back pain in Brazil. The lack of precise epidemiological data hinders the development of preventive strategies and adequate management, which can result in worse prognosis [75].

This study helped to reveal the main shortcomings of the current studies on the prevalence of low back pain in the Brazilian population. These findings can guide actions to produce robust evidence on this topic in the future. We strongly recommend future robust studies with low risk of bias.

**Resumen**

*El artículo describe la calidad metodológica de los estudios publicados sobre la prevalencia de dolor lumbar realizados en Brasil. Dieciocho estudios se consideraron elegibles, después de búsquedas en las siguientes bases de datos electrónicas: LILACS, PubMed, Embase, CINAHL, SPORTDiscus y SciELO. Se encontró una alta fuente de sesgo en los criterios de validez externos, relacionados con la toma de muestras, y el sesgo de no respuesta. Teniendo en cuenta los criterios de validez interna, la principal fuente de sesgo se relaciona con la falta de una definición de caso aceptable, y el uso de instrumentos que no tenían la fiabilidad y validez de constructo. No se encontraron estudios representativos que ofrecieran una prevalencia generalizable de dolor lumbar en Brasil. Los estudios publicados, incluidos en esta revisión, tenían un alto riesgo de sesgo que afecta a los datos de prevalencia. Son necesarios futuros estudios con diseño metodológico apropiado, con el fin de presentar el impacto real del dolor lumbar en Brasil para permitir comparaciones.*

*Dolor de la Región Lumbar; Sesgo (Epidemiología); Revisión*

## Contributors

P. R. C. Nascimento and L. O. P. Costa contributed to the study's conceptualization, elaboration, data analysis and interpretation, revision, and approval of the final version for publication..

## References


1. Walker BF. The prevalence of low back pain: a systematic review of the literature from 1966 to 1998. J Spinal Disord 2000; 13:205-17.
2. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, et al. A systematic review of the global prevalence of low back pain. Arthritis Rheum 2012; 64:2028-37.
3. Hart LG, Deyo RA, Cherkin DC. Physician office visits for low back pain. Frequency, clinical evaluation, and treatment patterns from a U.S. national survey. Spine (Phila Pa 1976) 1995; 20:11-9.
4. Ferreira ML, Machado G, Latimer J, Maher C, Ferreira PH, Smeets RJ. Factors defining care-seeking in low back pain: a meta-analysis of population based surveys. Eur J Pain 2010; 14:747.e1-.e7.
5. Krismer M, van Tulder M. Low back pain (nonspecific). Best Pract Res Clin Rheumatol 2007; 21: 77-91.
6. O'Sullivan P. Diagnosis and classification of chronic low back pain disorders: maladaptive movement and motor control impairments as underlying mechanism. Man Ther 2005; 10:242-55.
7. Marras WS. Spine biomechanics, government regulation, and prevention of occupational low back pain. Spine J 2001; 1:163-5.
8. Schneider S, Schmitt H, Zoller S, Schiltenwolf M. Workplace stress, lifestyle and social factors as correlates of back pain: a representative study of the German working population. Int Arch Occup Environ Health 2005; 78:253-69.
9. Volinn E. The epidemiology of low back pain in the rest of the world: a review of surveys in low- and middle-income countries. Spine (Phila Pa 1976) 1997; 22:1747-54.
10. Maetzel A, Li L. The economic burden of low back pain: a review of studies published between 1996 and 2001. Best Pract Res Clin Rheumatol 2002; 16:23-30.
11. Dagenais S, Caro J, Haldeman S. A systematic review of low back pain cost of illness studies in the United States and internationally. Spine J 2008; 8:8-20.
12. van Tulder MW, Koes BW, Bouter LM. A cost-of-illness study of back pain in The Netherlands. Pain 1995; 62:233-40.
13. Barker KL, Elliott CJ, Sackley CM, Fairbank JC. Treatment of chronic back pain by sensory discrimination training. A Phase I RCT of a novel device (FairMed) vs. TENS. BMC Musculoskelet Disord 2008; 9:97.
14. Hay EM, Dunn KM, Hill JC, Lewis M, Mason EE, Konstantinou K, et al. A randomised clinical trial of subgrouping and targeted treatment for low back pain compared with best current care. The STarT Back Trial Study Protocol. BMC Musculoskelet Disord 2008; 9:58.
15. Donzelli S, Di Domenica E, Cova AM, Galletti R, Giunta N. Two different techniques in the rehabilitation treatment of low back pain: a randomized controlled trial. Eura Medicophys 2006; 42:205-10.
16. Rasmussen-Barr E, Nilsson-Wikmar L, Arvidsson I. Stabilizing training compared with manual treatment in sub-acute and chronic low-back pain. Man Ther 2003; 8:233-41.
17. Kell RT, Asmundson GJ. A comparison of two forms of periodized exercise rehabilitation programs in the management of chronic nonspecific low-back pain. J Strength Cond Res 2009; 23:513-23.

18. Ewert T, Limm H, Wessels T, Rackwitz B, von Garnier K, Freumuth R, et al. The comparative effectiveness of a multimodal program versus exercise alone for the secondary prevention of chronic low back pain and disability. PM R 2009; 1:798-808.
19. Kuukkanen T, Malkia E, Kautiainen H, Pohjolainen T. Effectiveness of a home exercise programme in low back pain: a randomized five-year follow-up study. Physiother Res Int 2007; 12:213-24.
20. Boyle MH. Guidelines for evaluating prevalence studies. Evid Based Ment Health 1998; 1:37-9.
21. Almeida Filho N, Rouquayrol MZ. Introdução à epidemiologia. Rio de Janeiro: Ediora Guanabara Koogan; 2006.
22. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios. Um panorama da saúde no Brasil: acesso e utilização dos serviços, condições de saúde e fatores de risco e proteção à saúde, 2008. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2010.
23. Hayden JA, Dunn KM, van der Windt DA, Shaw WS. What is the prognosis of back pain? Best Pract Res Clin Rheumatol 2010; 24:167-79.
24. Carroll LJ, Hogg-Johnson S, van der Velde G, Haldeman S, Holm LW, Carragee EJ, et al. Course and prognostic factors for neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine (Phila Pa 1976) 2008; 33(4 Suppl):S75-82.
25. Rex-Michael AL, Newman J, Seetharam Rao A. The assessment of thoracic pain. Orthop Trauma 2010; 24:63-73.
26. Weijenborg PTM, Greeven A, Dekker FW, Peters AAW, ter Kuile MM. Clinical course of chronic pelvic pain in women. Pain 2007; 132 Suppl 1:S117-23.
27. Loving S, Nordling J, Jaszczak P, Thomsen T. Does evidence support physiotherapy management of adult female chronic pelvic pain? A systematic review. Scand J Pain 2012; 3:70-81.
28. Instituto Brasileiro de Geografia e Estatística. Censo demográfico. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2010.
29. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde. Rio de Janeiro: Ministério do Planejamento, Orçamento e Gestão; 2013.
30. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2014; 384:766-81.
31. Shiri R, Karppinen J, Leino-Arjas P, Solovieva S, Viikari-Juntura E. The association between obesity and low back pain: a meta-analysis. Am J Epidemiol 2010; 171:135-54.
32. Hoy D, March L, Brooks P, Woolf A, Blyth F, Vos T, et al. Measuring the global burden of low back pain. Best Pract Res Clin Rheumatol 2010; 24:155-65.
33. Hoy D, Brooks P, Woolf A, Blyth F, March L, Bain C, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J Clin Epidemiol 2012; 65:934-9.
34. Araujo IEM, Alexandre NMC. Ocorrência de cervicodorsolombalgias em funcionários de enfermagem em centro cirúrgico. Rev Bras Saúde Ocup 1998; 25:119-27.
35. Célia RCRS, Alexandre NMC. Distúrbios osteomusculares e qualidade de vida em trabalhadores envolvidos com transporte de pacientes. Rev Bras Enferm 2003; 56:494-8.
36. Gurgueira GP, Alexandre NMC, Corrêa Filho HR. Prevalência de sintomas músculo-esqueléticos em trabalhadoras de enfermagem. Rev Latinoam Enferm 2003; 11:608-13.
37. Peres CPA. The postural disturbances in physical therapists: an occupational biomechanic approach. Fisioter Mov 2004; 17:19-25.
38. Silva MC, Fassa AG, Valle NC. Chronic low back pain in a Southern Brazilian adult population: prevalence and associated factors. Cad Saúde Pública 2004; 20:377-85.
39. Fassa AG, Facchini LA, Dall'Agnol MM, Christiani DC. Child labor and musculoskeletal disorders: the Pelotas (Brazil) epidemiological survey. Public Health Rep 2005; 120:665-74.
40. Andrusaitis SF, Oliveira RP, Barros Filho TEP. Study of the prevalence and risk factors for low back pain in truck drivers in the state of São Paulo, Brazil. Clinics 2006; 61:503-10.
41. Kreling MC, da Cruz DA, Pimenta CA. Prevalência de dor crônica em adultos. Rev Bras Enferm 2006; 59:509-13.
42. Almeida ICGB, Sá KN, Silva M, Baptista A, Matos MA, Lessa I. Prevalência de dor lombar crônica na população da cidade de Salvador. Rev Bras Ortop 2008; 43:96-102.
43. Matos MG, Hennington EA, Hoefel AL, Dias-da-Costa JS. Lower back pain in health insurance policyholders: prevalence and associated factors. Cad Saúde Pública 2008; 24:2115-22.
44. Motta AF, Cardoso FL, Sacomori C, Sperandio FF, Santos GM. Dor lombar auto-referida em mulheres trabalhadoras rurais de sete comunidades de Concórdia-SC. Ter Man 2010; 8:10-6.
45. de Vitta A, Martinez MG, Piza NT, Simeão SFAP, Ferreira NP. Prevalência e fatores associados à dor lombar em escolares. Cad Saúde Pública 2011; 27:1520-8.
46. Falavigna A, Teles AR, Mazzocchin T, De Braga GL, Kleber FD, Barreto F, et al. Increased prevalence of low back pain among physiotherapy students compared to medical students. Eur Spine J 2011; 20:500-5.
47. Fernandes RCP, Carvalho FM, Assunção AA. Prevalence of musculoskeletal disorders among plastics industry workers. Cad Saúde Pública 2011; 27:78-86.
48. Ferreira GD, Silva MC, Rombaldi AJ, Wrege ED, Siqueira FV, Hallal PC. Prevalence and associated factors of back pain in adults from Southern Brazil: a population-based study. Rev Bras Fisioter 2011; 15:31-6.
49. Onofrio AC, Da Silva MC, Domingues MR, Rombaldi AJ. Acute low back pain in high school adolescents in Southern Brazil: prevalence and associated factors. Eur Spine J 2012; 21:1234-40.

50. Dellaroza MS, Pimenta CA, Duarte YA, Lebrão ML. Dor crônica em idosos residentes em São Paulo, Brasil: prevalência, características e associação com capacidade funcional e mobilidade (Estudo SABE). Cad Saúde Pública 2013; 29:325-34.
51. Meucci RD, Fassa AG, Paniz VMV, Silva MC, Wegman DH. Increase of chronic low back pain prevalence in a medium-sized city of southern Brazil. BMC Musculoskelet Disord 2013; 14:155.
52. de Barros EN, Alexandre NM. Cross-cultural adaptation of the Nordic musculoskeletal questionnaire. Int Nurs Rev 2003; 50:101-8.
53. Meziat Filho N, Silva GA. Invalidez por dor nas costas entre segurados da Previdência Social do Brasil. Rev Saúde Pública 2011; 45:494-502.
54. Louw QA, Morris LD, Grimmer-Somers K. The prevalence of low back pain in Africa: a systematic review. BMC Musculoskelet Disord 2007; 8:105.
55. Hestbaek L, Larsen K, Weidick F, Leboeuf-Yde C. Low back pain in military recruits in relation to social background and previous low back pain. A cross-sectional and prospective observational survey. BMC Musculoskelet Disord 2005; 6:25.
56. Bjorck-van Dijken C, Fjellman-Wiklund A, Hildingsson C. Low back pain, lifestyle factors and physical activity: a population based-study. J Rehabil Med 2008; 40:864-9.
57. Valat JP, Goupille P, Vedere V. Low back pain: risk factors for chronicity. Rev Rhum Engl Ed 1997; 64:189-94.
58. Shiri R, Karppinen J, Leino-Arjas P, Solovieva S, Viikari-Juntura E. The association between obesity and low back pain: a meta-analysis. Am J Epidemiol 2010; 171:135-54.
59. Sitthipornvorakul E, Janwantanakul P, Purepong N, Pensri P, van der Beek AJ. The association between physical activity and neck and low back pain: a systematic review. Eur Spine J 2011; 20: 677-89.
60. Taanila HP, Suni JH, Pihlajamaki HK, Mattila VM, Ohrankammen O, Vuorinen P, et al. Predictors of low back pain in physically active conscripts with special emphasis on muscular fitness. Spine J 2012; 12:737-48.
61. Dionne CE, Dunn KM, Croft PR. Does back pain prevalence really decrease with increasing age? A systematic review. Age Ageing 2006; 35:229-34.
62. Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine (Phila Pa 1976) 2002; 27:E109-20.
63. Thorbjornsson CB, Alfredsson L, Fredriksson K, Michelsen H, Punnett L, Vingard E, et al. Physical and psychosocial factors related to low back pain during a 24-year period. A nested case-control analysis. Spine (Phila Pa 1976) 2000; 25:369-74.
64. Bakker EW, Verhagen AP, Lucas C, Koning HJ, de Haan RJ, Koes BW. Daily spinal mechanical loading as a risk factor for acute non-specific low back pain: a case-control study using the 24-Hour Schedule. Eur Spine J 2007; 16:107-13.
65. Coenen P, Kingma I, Boot CR, Twisk JW, Bongers PM, van Dieen JH. Cumulative low back load at work as a risk factor of low back pain: a prospective cohort study. J Occup Rehabil 2013; 23:11-8.
66. Feldman DE, Shrier I, Rossignol M, Abenhaim L. Risk factors for the development of low back pain in adolescence. Am J Epidemiol 2001; 154:30-6.
67. Shiri R, Karppinen J, Leino-Arjas P, Solovieva S, Viikari-Juntura E. The association between smoking and low back pain: a meta-analysis. Am J Med 2010; 123:87.e7-35.
68. Harreby M, Kjer J, Hesselsoe G, Neergaard K. Epidemiological aspects and risk factors for low back pain in 38-year-old men and women: a 25-year prospective cohort study of 640 school children. Eur Spine J 1996; 5:312-8.
69. Hestbaek L, Leboeuf-Yde C, Kyvik KO, Manniche C. The course of low back pain from adolescence to adulthood: eight-year follow-up of 9600 twins. Spine (Phila Pa 1976) 2006; 31:468-72.
70. Loney PL, Stratford PW. The prevalence of low back pain in adults: a methodological review of the literature. Phys Ther 1999; 79:384-96.
71. Guimarães PRB. Métodos quantitativos estatísticos. Curitiba: IESDE Brasil S.A.; 2008.
72. Dionne CE, Dunn KM, Croft PR, Nachemson AL, Buchbinder R, Walker BF, et al. A consensus approach toward the standardization of back pain definitions for use in prevalence studies. Spine (Phila Pa 1976) 2008; 33:95-103.
73. Leboeuf-Yde C, Lauritsen JM. The prevalence of low back pain in the literature. A structured review of 26 Nordic studies from 1954 to 1993. Spine (Phila Pa 1976) 1995; 20:2112-8.
74. Kelley K, Clark B, Brown V, Sitzia J. Good practice in the conduct and reporting of survey research. Int J Qual Health Care 2003; 15:261-6.
75. Costa LCM, Maher CG, Hancock MJ, McAuley JH, Herbert RD, Costa LOP. The prognosis of acute and persistent low-back pain: a meta-analysis. CMAJ 2012; 184:E613-24.

Submitted on 23/Mar/2014
Final version resubmitted on 05/Feb/2015
Approved on 02/Mar/2015