Author's response to reviews

Title: Prevalence of chronic musculoskeletal disorders in elderly Brazilians: a systematic review of the literature

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Author's response to reviews: see over
We would like to thank the important comments of the reviewers and the editor. Given the concern with some studies missed by our search strategy, we decided to run the literature search again and this time to update it until January 2012.

After the new search and assessment of eligibility by two independent review authors, 23 studies were included (11 more than those included in the original search). It was noticed by the review authors that some problem occurred when exporting the references to Endnote X1. Because of an unknown reason, some references were deleted and this was the reason why some studies were not screened. This problem was discovered and corrected after the new search. We would like to apologize for this mistake and once again we thank the reviewers for pointing the problem out.

Because of the high number of additional studies included, it was necessary to make many changes to the manuscript text, thus allowing the results of all studies to be considered. All changes were highlighted by “Windows track changes” and can be visualized by the reviewers. However, because it can be confusing to read the text with all the red marks from "track changes", we have decided to remove these marks from the main manuscript file and to upload a copy containing all the marks in the end of this cover letter (see below).

Yours sincerely,

Dr Luciana Machado (on behalf of all review authors)
Prevalence of chronic musculoskeletal disorders in elderly Brazilians: a systematic review of the literature

Short title (running head): Prevalence of chronic musculoskeletal disorders

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ABSTRACT

Background. Population ageing is a worldwide phenomenon that has recently challenged public healthcare systems. The knowledge of the burden of chronic musculoskeletal disorders in elders is still limited, particularly in the developing world. This systematic review aimed to investigate the prevalence of chronic musculoskeletal disorders in elderly Brazilians.

Methods. A comprehensive literature search was performed in five electronic databases (from inception to January 2020) and completed by additional searches in reference lists and government reports. Two review authors independently selected the eligible studies and extracted data on participants’ characteristics and rates of chronic musculoskeletal disorders. One review author extracted methodological quality data. We performed a critical synthesis of the results, which were grouped into the diagnoses “chronic musculoskeletal pain” or “specific musculoskeletal diagnoses”.

Results. Twenty-three studies reporting on a total of 116,091 elderly Brazilians were included. Eight studies (35%) were of high methodological quality. There was a large variation in the measure of prevalence used by individual studies and in their definition of chronic pain. Prevalence estimates reached 86% for chronic musculoskeletal pain in any location. Most studies investigating multiple pain sites found the lower limb pain and the spine to be the most prevalent complaints (25% each to 52%), followed by spinal pain, which also showed the highest single prevalence estimate (5% to 65%). Arthritis and rheumatism (including osteoarthritis) were the most prevalent specific musculoskeletal diagnoses (9% to 34%), followed by herniated disc (6% to 27%).

Conclusions. Despite the growth of the elderly population worldwide, high-quality research on the burden of chronic musculoskeletal disorders in the elderly is still scarce. Future healthcare research focusing on this age group should be a priority in developing countries since their public healthcare systems are not yet fully prepared to accommodate the needs of an aging population.
**Keywords:** prevalence, epidemiology, chronic pain, musculoskeletal disorders, elderly.
BACKGROUND

Population ageing is a worldwide phenomenon caused by the reductions in adult mortality and fertility. The latter is the primary cause of population ageing given that sustained fertility reductions lead to an increase in the proportion of older age groups [1]. This demographic change was first observed in developed countries in the nineteenth century and more recently has been transforming the societies of developing and low-income countries. In Brazil, fertility rates dropped by 60% between 1970 and 2000 [2]. The latest population census conducted in 2010 identified over 20.5 million elderly Brazilians [3]. By 2050, it is expected that this number reaches 64 million, placing Brazil as the fifth nation with the greatest number of older people [1].

With population ageing, the most prevalent types of diseases shift from acute infectious to chronic non-communicable diseases, such as chronic musculoskeletal conditions. In the most recent Brazilian National Household Survey, around 80% of Brazilians with 60 years or more reported having at least one chronic non-communicable disease, with chronic musculoskeletal disorders being the most prevalent group of diseases (including spine problems, osteoarthritis and rheumatoid arthritis) [4].

Pain is the primary complaint of individuals with chronic musculoskeletal disorders [5], and it is particularly important in the elderly because of its impact on quality of life, independence and social participation. The economic burden of musculoskeletal pain is enormous, being only lower to that caused by cardiovascular disease [6]. Most individuals will present with “nonspecific pain”, a condition in which it is not possible to identify a single specific cause for the pain, even when pain is restricted to one location (e.g. lower back) [7]. This situation is challenging to healthcare practitioners since it requires a more complex approach to diagnosis and treatment. Conversely, a specific diagnosis is possible for some chronic musculoskeletal disorders, such as osteoarthritis. However, regardless of whether a specific diagnosis is possible, the presence of co-morbidities in the elderly makes pain management even more challenging.
The high prevalence of chronic musculoskeletal disorders along with population ageing is worrisome. This is particularly problematic in developing and low-income countries, where the society and the public healthcare system are not yet fully prepared to fulfill the needs required by this recent scenario. Knowing the problem in details is essential for the development of appropriate health policies that incorporate a strategic plan for the promotion of health and prevention of disabilities in the elderly population. This systematic review investigated the prevalence of chronic musculoskeletal disorders in elderly Brazilians.

METHODS

Search strategy
The following electronic databases were searched from inception to January 2010: MEDLINE, LILACS, SCIELO, Brazilian Digital Library of Theses and Dissertations (BDTD) and CAPES/MEC Theses Database. The search terms and combinations used for MEDLINE were ((musculoskeletal diseases OR rheumatic diseases OR rheumatology OR arthritis OR osteoarthritis) AND prevalence AND (elder* OR aging OR aged OR geriatric*) AND (cross-sectional OR survey) AND Brazil). The search strategies for the other databases are available upon request. We also hand searched reference lists of relevant reviews and primary studies. Finally, the Brazilian Institute of Geography and Statistics (IBGE) website was searched for government reports on national household surveys investigating health topics. Our searches did not have any language restrictions.

Study selection
Study selection was performed by two independent review authors, and a third review author was consulted to solve disagreements. Eligibility was first assessed through the screening of titles and abstracts, and the full text of all potentially eligible papers was retrieved to confirm eligibility.
Cross-sectional studies reporting on the prevalence of chronic musculoskeletal disorders in elderly Brazilians were eligible for inclusion. Among the numerous diagnoses considered within the group of chronic musculoskeletal disorders, it was decided *a priori* that all were to be included except for temporomandibular joint (TMJ) disorders, rheumatoid arthritis, systemic lupus erythematosus and osteoporosis. These diagnoses were excluded because of the particularities of their underlying mechanisms and clinical presentations.

To determine whether the study reported on chronic musculoskeletal disorders, we relied upon information presented in the manuscript title, text or tables. For the definition of elderly, we followed the recommendation of the Department of Economic and Social Affairs of the United Nations (UN), which considers as elders those individuals with 60 years of age or older [1]. Studies reporting on the prevalence of musculoskeletal disorders in various age groups were considered for inclusion only when it was possible to extract prevalence data in the elderly population.

**Data extraction and quality assessment**

Two review authors independently extracted data on study characteristics (design, location, measure of prevalence), participants’ characteristics and rates of chronic musculoskeletal disorders. One review author extracted data to evaluate the methodological quality of studies. Internal validity was assessed according to the following criteria [8]: (1) adequacy of sampling (random sample); (2) sample size calculation; (3) sufficient response rate (> 80%); (4) low potential for recall bias (assessment of present chronic pain instead of past chronic pain); (5) use of a validated measurement tool or physical examination by a doctor/physiotherapist to ascertain chronic musculoskeletal disorders. Study quality was considered low if at least 3/5 quality criteria were not met.

**Data synthesis**

Results of the included studies were grouped into the diagnoses “chronic musculoskeletal pain” or “specific musculoskeletal diagnoses”, and a critical synthesis of the results was performed.
RESULTS

The electronic search retrieved 746,877 potentially eligible studies: 20,370 in MEDLINE, 268 in LILACS, 37 in SCIELO, 84,106 in BDTD and 196 in CAPES/MEC Theses Database. After screening of full texts, a total of the exclusion of duplicate publications, only four 17 studies fulfilled the inclusion criteria and were included [5, 9-24]. Six Seven additional eligible studies were found after screening of reference lists of relevant studies were included [25-30]. Among the government reports retrieved from the search in IBGE website, only one (about the Brazilian National Household Survey conducted in 2008) provided sufficient data on the prevalence of chronic musculoskeletal disorders in the elderly population. Figure 1 describes the selection of the 23 included studies.

The full text of two studies [26, 30] could not be retrieved and relevant data were extracted from their abstracts. One of the included studies reported on the results of the Brazilian National Household Surveys conducted in 1998, 2003 and 2008 [16]. Results from each of these surveys were considered separately in this review [16a-16c]. The included studies reported on a total of 116,091–26,190,766 elderly Brazilians, with each study presenting individual samples sizes varying from 25 [25] to 14,532,000–41,269 [16c] participants.

Brazil is a Federative Republic made up of 26 Federation Units called States and the Federal District (Brasilia). Except for the Brazilian National Household Surveys, which recruited participants from all Federation Units [16a-16c], the included studies were conducted in four seven different States: Bahia [12, 13, 21, 25], Goiás [28], Minas Gerais [14, 18, 23], Paraná [5, 11, 20, 29, 30], Rio Grande do Sul [24, 26], Santa Catarina [17, 27] and São Paulo [9, 10, 15, 19, 22]. Eight One studies were conducted in a capital cities with population ranging from 421,000 over 1.4 (Florianópolis [27]) to 11.3 million inhabitants (São Paulo [19, 22]) [31].

Most study samples included community-dwelling elders, predominantly women in the age group of 60 to 69 years old. One Three studies [10, 12, 27] recruited
elders seeking care from a healthcare practitioner/physiotherapist, and one [13] recruited institutionalized elders. One study recruited both institutionalized elders and elders seeking care in an Emergency Department [20].

The procedure used for data collection and the measure of prevalence used by the included studies are listed in Table 2. Only one study [12] did not collect prevalence data through a face-to-face interview, using information from medical records instead. Two studies [13, 26] used validated questionnaires to evaluate the presence and quality of chronic pain. In six studies the musculoskeletal diagnosis was given or confirmed by a healthcare practitioner after clinical or radiological examination [9, 10, 20, 22, 23, 27]. In all the other studies pain was evaluated by single questions about its presence, location and intensity [5, 11, 14-19, 21, 24, 25, 28-30].

According to the study reports, chronic pain was considered the pain that persisted for six weeks or more [18], seven weeks or more [24], three months or more [22], or six months or more [5, 11, 21, 28-30]. In half of the included studies, authors did not make clear what was their definition for chronic symptoms [12-17, 19, 23, 25, 26].

Most eight studies (66.778.3%) investigated the report of present musculoskeletal disorders [9-13, 15, 16a, 17, 19-22, 24, 25, 27-30], whereas other studies provided prevalence data based on recall periods that ranged from one week [23, 26] to lifetime [14, 16b, 16c, 18]. Three-four studies [9, 14, 16a-16c, 18] allowed the response to be reported by proxy (either another household member or caregiver).

The main results on the prevalence of chronic musculoskeletal disorders are presented in Table 1. Only three-eight studies (25.34.8%) were of high methodological quality [9, 10, 15, 16a, 21-24]. Only one study fulfilled all the quality criteria [23]. These were the only studies where participants were chosen
by random sampling methods and where the sample size was calculated. Quality ratings for each included study are described in Table 3. No study reported confidence intervals or standard errors for prevalence estimates.

**Prevalence of chronic musculoskeletal disorders**

The main results on the prevalence of chronic musculoskeletal disorders are presented in Table 3 (Additional file).

**Musculoskeletal pain**

Fifteen studies estimated the prevalence of chronic musculoskeletal pain [5, 9, 11-13, 15, 18, 21, 22, 24-26, 28-30]. Studies reporting on the prevalence of chronic musculoskeletal pain in any location found estimates ranging from 51.4 to 85.5% [12] in elderly Brazilians. Among the studies evaluating multiple pain sites, the lower limb-spine (50.0%) was more often reported as the most prevalent pain location [5, 13, 26, 28], followed by spinal pain (including low back pain) and the lower limb (50.0%) [11, 25, 29, 30]. The authors also found pain interference with functional tasks, sleep and mood in a large proportion of elders. Nearly one third of elders from the study of Lacerda et al [28] feared a new lesion (Table 3) (61.3% and 55.0%, respectively), and statistically significant associations between chronic musculoskeletal pain and the following functional tasks: walk near home (p =...
0.003); get in and out of bed \((p = 0.014)\); travel \((p < 0.001)\); shop \((p = 0.005)\); cook own meal \((p = 0.005)\); domestic chores \((p < 0.001)\); take care of own money \((p = 0.046)\).

**Prevalence of specific musculoskeletal diagnoses**

Sixteen studies (70.0%) estimated the prevalence of specific musculoskeletal diagnoses [9, 10, 12, 14-20, 22, 23, 25, 27]. In seven studies the specific diagnosis was given by a healthcare professional [9, 10, 12, 20, 22, 23, 27], whereas other studies used participants’ self-report on whether they had the disease or had been received a given diagnosis by a doctor or other healthcare professional. Most studies generally reported prevalence estimates for arthritis and rheumatism in general (including osteoarthritis), with prevalence estimates ranging from 9.4% [25] to 39.6% [17]. Four studies investigated the presence of osteoarthritis in specific body sites (hand [10, 20] and knee [9, 27]), which were lower among males under 70 years old (16.7%), and higher among women over 80 years old (39.1%). Prevalence estimates ranged from 14.2% to 28.3% for hand osteoarthritis and from 20.6% to 37.5% for knee osteoarthritis. Two studies measured the prevalence of osteoarthritis and found estimates of 33.6% in elders who sought physiotherapy treatment and 9.4% in community-dwelling elders.

Four of these studies [12, 22, 23, 25] investigated the prevalence of other musculoskeletal diagnoses and found the following prevalence estimates: varied from 3.8% to 16.9% for bursitis, 6.1% to 26.9% for herniated disc, and 9.2% to 18.1% for fracture, 9.2% to 14.4% for tendinitis, 9.4% for chondromalacia and 0.0% to 5.5% for fibromyalgia.

Four studies measured the prevalence of tendinitis, with estimates ranging from 3.5% to 14.4%.
**Prevalence of Chronic musculoskeletal disorders in different patient groups**

A statistically significant association between the presence of chronic musculoskeletal disorders and female gender was observed in the studies of Dellaroza et al [14] (p = 0.004) and Machado et al [11] (p ≤ 0.001). Dellaroza et al [14] also found higher prevalence estimates among depressive participants (p < 0.001). Machado et al [11] reported a positive association between chronic musculoskeletal pain and body mass index (BMI) over 25 kg/m², and between rheumatism and BMI over 25 kg/m² but below 35 kg/m². For instance, a BMI between 30 kg/m² and 34 kg/m² increased the chance of rheumatism and pain by 2 (OR 1.99; 95%CI 1.20 to 3.28) and 3.5 (OR 3.55; 2.20 to 5.71), respectively. There was a lack of association between the presence of chronic musculoskeletal disorders and age in elders [11, 14].

Twelve studies [10, 11, 13, 14, 17-22, 27, 30] investigated the association of the presence of chronic musculoskeletal disorders with a wide range of factors. A Studies reported statistically significant associations - between chronic musculoskeletal disorders and older age [11, 27], female gender [11, 18, 20-22], married status [21], cognitive deficit [13], current or previous smoking [18, 21], report of falls [17] and co-morbidities [18]; lower education [18, 22], lower income [18], lower functional capacity [14, 19, 30], lower pain threshold [22]; higher BMI [10, 18, 22, 27], excessive alcohol consumption [21], work impact [22], fatigue [22], tiredness [22], stiffness [22], depression [11] and anxiety [22]. These associations are described in details in Table 3 (Additional file).

**DISCUSSION**

To our knowledge this was the first systematic review to synthesize the results of studies investigating the prevalence of chronic musculoskeletal disorders in elderly Brazilians. Evidence from the included studies indicated that these disorders affect an important part of the elderly population, with estimates reaching 85.5% for chronic musculoskeletal pain in any location.
The most representative prevalence estimates come from the Brazilian National Household Surveys conducted in 1998, 2003 and 2008, which present data from over 105,200 community-dwelling elders living in every Brazilian State and the Federal District. The use of such broad samples are important in epidemiological research of continental-sized countries like Brazil, where the socio-demographic characteristics of the population are largely variable across the national territory; for example, the Human Development Index (HDI) of Bahia is 0.59, whereas the HDI of Rio Grande do Sul is 0.753 [32].

Interestingly, the prevalence of chronic musculoskeletal disorders has decreased between the Brazilian National Household Surveys conducted in 1998 and 2003 and between the surveys conducted in 1998 and 2008, but not between the latest two occasions of the national survey. This has been attributed to changes in how prevalence was measured in these surveys [16].

The definitions of chronic musculoskeletal pain were largely variable among the included studies. According to the International Association for the Study of Pain (IASP), chronic pain is defined as an episode of pain of at least six months [6]. Specifically for chronic low back pain, the most recent clinical practice guidelines define as chronic an episode of low back pain of at least 12 weeks [33]. In most studies included in this systematic review (66.7%), the definitions of chronic pain did not reflect these recommendations or the authors did not offer sufficient information to judge. The inconsistency among definitions is a problem given that it limits the interpretation and comparison among study results on this topic.

Two previous systematic reviews investigated the prevalence of low back pain in the elderly [34, 35], but none of them included the studies conducted in Brazil. Bressler et al [34] found prevalence estimates for low back pain ranging from 12.83% to 49.0% among community-dwelling elders. According to our results, the prevalence of low back pain in elderly Brazilians ranged from 5.1% to 65.2%. This large variation in prevalence estimates may be due to a number
of factors, which include different definitions of chronic symptoms, recall bias and proxy reporting.

The review of Dionne et al [35] reported the presence of a linear relationship between severe low back pain and age, but not between benign low back pain and age. The positive association between chronic musculoskeletal disorders and age were also reported in two studies included in the present review [11, 27]. In the study of Dellaroza et al [11], this association was present among elders reporting low levels of pain. According to our results, the prevalence of low back pain in elderly Brazilians ranged from 5.1% to 65.2%. This large variation in prevalence estimates may be due to a number of factors, which include different definitions of chronic symptoms, recall bias and proxy reporting.

Low back pain is currently listed as the most prevalent musculoskeletal disorder among adults in the world [36]. Nevertheless, our results indicate that the prevalence of low back pain is lower than similar to the prevalence of lower limb pain in elderly Brazilians. This finding is similar-comparable to that of Urwin et al [37], who investigated the prevalence of musculoskeletal disorders in 5,000 individuals from Manchester (UK). The authors found that low back pain was the most prevalent musculoskeletal disorder in individuals younger than 65 years old, whereas knee pain was the most prevalent condition in those aged 65 years or more, with a peak in women aged 75 years and older [37].

It is possible that the differences in self-reported prevalence estimates among the various age groups would reflect extrinsic factors not related to an actual dissimilar distribution of chronic musculoskeletal pain. One factor would be related to the disability (or its perception by the individual) associated with chronic pain. If this is the case, low back pain may be the most prevalent musculoskeletal disorder among elders, but lower limb pain is more frequently reported by them given its greater impact on function, including gait impairments and increased risk of falls. It is also possible that elders consider low back pain as a trivial and less important condition because they may have
experienced many low back pain episodes throughout the lifespan that did not lead to any serious consequences to their health.

The presence of co-morbidities, which are common in elders, can also affect their perception of pain. Dellaroza et al [11] found a significant increase in the report of chronic musculoskeletal pain among depressive elders. A number of recently published studies provide evidence to support the relationship between chronic musculoskeletal pain and depression [38-40]. Other co-morbidities that may over- or underestimate the report of chronic musculoskeletal pain in elders are cognitive impairments, changes in pain perception and decreased mobility due to the aging process. Interestingly, our findings reflect the importance not only of co-morbidities that directly affect the perception of pain (i.e. depression, anxiety, cognitive deficit), but also co-morbidities that may impact the perception or the report of pain in elders by indirect mechanisms. Some co-morbidities found to be associated with chronic musculoskeletal pain in this review include cardiovascular diseases and diabetes (Table 3 - Additional file).

The diagnosis of osteoarthritis is strongly associated with ageing, irrespective of the location (small joints or large weight bearing joints) or gender [41]. Among the specific musculoskeletal diagnoses investigated by the studies included in this review, the broad group of arthritis and rheumatism (including osteoarthritis) was the most prevalent, followed by the diagnosis of herniated disc. In 2004, the World Health Organization (WHO) estimated that over 150 million individuals had osteoarthritis in the world and that this condition was the fifth and ninth cause of years lost due to disability (YLD) in low/middle-income and high-income countries, respectively [42]. Moreover, recent data indicate a staggering 30% increase in the prevalence of this condition in one decade [43]. This large increase is due to a combination of factors, which include ageing of the population, rising prevalence of risk factors (i.e. obesity), and the increased use of imaging [43, 44].

We found higher self-reported prevalence rates of chronic musculoskeletal disorders among elderly women. This result is in line with the literature and may
be related to fact that women are better at perceiving their physical signs and symptoms than men, and to the knowledge acquired from their role as the family caregiver [45]. Additionally, women may have a higher risk of developing musculoskeletal problems due to anatomo-functional particularities such as shorter height, lower muscle mass and bone mineral density, increased joint laxity and lower degree of adaptation to physical effort [24, 46].

The number of epidemiological studies investigating the prevalence of chronic musculoskeletal disorders among elders is still limited, particularly in developing and low-income countries. This reflects the socioeconomic demand for research focusing on the working population. **Along with the limited number of studies targeting the elderly population, the low quality of the existing studies makes the interpretation of the evidence still more difficult; for example, only one third of the studies included in this review were of high quality.**

With the growth of the elderly population in the developing world, future high-quality research focusing on this age group is mandatory in order to clarify the health needs of this population and to plan necessary changes in the public healthcare system.

**CONCLUSIONS**
Brazil will soon be the fifth nation with the greatest number of older people in the world. However, high-quality epidemiological research on chronic musculoskeletal disorders in elderly Brazilians is still limited. The results of this review indicate that chronic musculoskeletal disorders are highly prevalent among elderly Brazilians and should therefore be considered in future public healthcare policies targeting this age group.

**COMPETING INTERESTS**
The authors declare that they have no competing interests.

**AUTHORS’ CONTRIBUTIONS**
VM, LM and JD participated in the conception and design of the study. VM and VdC performed the literature search and selection of studies. VM, VdC and LM extracted relevant data. VM, LM and JD participated in the analysis and interpretation of data and in the preparation and revision of this manuscript. All authors read and approved the final manuscript.

ACKNOWLEDGEMENTS AND FUNDING
This research was supported by Fundação de Amparo à Pesquisa de Minas Gerais (FAPEMIG), Brazil. LM currently holds a Post-Doctoral Fellowship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil.
REFERENCES


## TABLES AND CAPTIONS

Table 21. Measures of prevalence of chronic musculoskeletal disorders.

<table>
<thead>
<tr>
<th>Study</th>
<th>Measure of prevalence</th>
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</thead>
<tbody>
<tr>
<td>Alves[26]</td>
<td>In a face-to-face interview, participants filled in the Portuguese-Brazil version of the Nordic Musculoskeletal Questionnaire [47], which assessed the presence of pain or discomfort in a specific anatomical area in the past 12 months and in the past week (including present pain), and if the pain interfered with activities of daily living.</td>
</tr>
<tr>
<td>Backer[27]</td>
<td>Health care practitioner followed the ACR criteria to diagnose knee OA by clinical examination.</td>
</tr>
<tr>
<td>Cassettari[9]</td>
<td>In a face-to-face interview, participants (or caregiver) were asked if they had knee pain. Participants reporting knee pain were examined by a rheumatologist to confirm the clinical diagnosis of OA.</td>
</tr>
<tr>
<td>Coimbra[10]</td>
<td>Medical diagnosis of OA by clinical examination. Details of the examination were not described. Diagnosis of hand OA was confirmed by x-ray.</td>
</tr>
<tr>
<td>Dellaroza[5]</td>
<td>In a face-to-face interview, participants were asked about the presence of musculoskeletal pain lasting for 6 months or more (continuous or recurrent pain) in the past 12 months, its location, frequency and intensity.</td>
</tr>
<tr>
<td>Dellaroza[11]</td>
<td>In a face-to-face interview, participants were asked about the presence of musculoskeletal pain lasting for 6 months or more (continuous or recurrent pain), its location, frequency and intensity.</td>
</tr>
<tr>
<td>dosReis[12]</td>
<td>Medical records were screened and data were extracted regarding musculoskeletal diagnoses and main complaints.</td>
</tr>
<tr>
<td>dosReis[13]</td>
<td>In a face-to-face interview, participants filled in the McGill Pain Questionnaire [48], which assessed pain location, pain descriptors and intensity.</td>
</tr>
<tr>
<td>Giacomini[14]</td>
<td>In a face-to-face interview, participants (or another household member or caregiver) were asked if they had ever received the diagnosis of arthritis by a doctor or other healthcare professional.</td>
</tr>
<tr>
<td>Lacerda[28]</td>
<td>In a face-to-face interview, participants were asked about the presence of chronic pain, defined as &quot;an unpleasant sensorial or emotional experience, constant or recurrent, which end cannot be foreseen, lasting for more than six months&quot;, its location and intensity.</td>
</tr>
<tr>
<td>Lima[15]</td>
<td>In a face-to-face interview, participants were asked if they had one of the following musculoskeletal problems: arthritis, rheumatism and back pain.</td>
</tr>
<tr>
<td>Lima-Costa[16a]</td>
<td>In a face-to-face interview, participants (or another household member or caregiver) were asked if they had arthritis or rheumatism.</td>
</tr>
<tr>
<td>Lima-Costa[16b]</td>
<td>In a face-to-face interview, participants (or another household member or caregiver) were asked if they had ever received the diagnosis of arthritis or rheumatism by a doctor or other healthcare professional.</td>
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<tr>
<td>Lima-Costa[16c]</td>
<td>Same as above.</td>
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<tr>
<td>Liposcki[17]</td>
<td>In a face-to-face interview, participants were asked if they had OA.</td>
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</table>
Machado[18] In a face-to-face interview, participants (or another household member or caregiver) were asked if they had ever been diagnosed with rheumatism by a doctor and the level of associated disability, and if they had ever presented with pain (including aching and stiffness) in the hands or knees on most days for at least 6 weeks. These questions were copied from the Third National Health and Nutrition Examination Survey [49] and translated by the authors to Portuguese-Brazil.

Menéndez[19] In a face-to-face interview, participants were asked if they had arthritis.

Panazzolo[29] In a face-to-face interview, participants were asked about the presence of musculoskeletal pain lasting for 6 months or more (continuous or recurrent pain) and its location.

Panazzolo[30] In a face-to-face interview, participants were asked about the presence of musculoskeletal pain lasting for 6 months or more (continuous or recurrent pain), its location, frequency and intensity, and if the pain interfered with function, sleep or mood.

Rey[20] Assessor followed the ACR criteria to diagnose hand OA by clinical examination.

Sá[21] In a face-to-face interview, participants were asked about the presence of chronic pain, defined as pain felt more than one time at the same body region for over 6 months, and its location.

Sampaio[25] In a face-to-face interview, participants were asked about the presence of chronic pain and pre-existing musculoskeletal pathologies.

Santos[22] Chronic widespread pain was diagnosed by two trained researchers if the participant presented with diffuse pain in the axial skeleton on both sides of the body, above and beyond the hip, for more than 3 months with less than 11 positive tender points (assessed using a Fischer dolorimeter). Fibromyalgia was diagnosed by a rheumatologist according to the ACR criteria.

Senna[23] In a face-to-face interview, participants were asked about the presence of pain or tenderness in bones, joints, or muscles in the last 7 days that was not related to trauma. Those answering “yes” were examined by a rheumatologist to confirm the diagnosis of OA or fibromyalgia.

Silval[24] In a face-to-face interview, participants were asked about the presence of low back pain for at least 7 weeks.

Legend:

OA = osteoarthritis; ACR = American College of Rheumatology.
Table 3. Methodological quality of included studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>Quality criteria</th>
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<tr>
<td></td>
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<tr>
<td>Alves[26]</td>
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<tr>
<td>Backer[27]</td>
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<tr>
<td>Cassettari[9]</td>
<td>+</td>
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<td>Coimbra[10]</td>
<td>-</td>
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<tr>
<td>Dellaroza[5]</td>
<td>-</td>
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<tr>
<td>Dellaroza[11]</td>
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<tr>
<td>dosReis[12]</td>
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<td>dosReis[13]</td>
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<td>Giacomin[14]</td>
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<td>Lacerda[28]</td>
<td>-</td>
</tr>
<tr>
<td>Lima[15]</td>
<td>+</td>
</tr>
<tr>
<td>Lima-Costa[16a]</td>
<td>+</td>
</tr>
<tr>
<td>Lima-Costa[16b]</td>
<td>+</td>
</tr>
<tr>
<td>Lima-Costa[16c]</td>
<td>+</td>
</tr>
<tr>
<td>Liposcki[17]</td>
<td>-</td>
</tr>
<tr>
<td>Machado[18]</td>
<td>-</td>
</tr>
<tr>
<td>Menéndez[19]</td>
<td>+</td>
</tr>
<tr>
<td>Panazzolo[29]</td>
<td>-</td>
</tr>
<tr>
<td>Panazzolo[30]</td>
<td>-</td>
</tr>
<tr>
<td>Rey[20]</td>
<td>-</td>
</tr>
<tr>
<td>Sá[21]</td>
<td>+</td>
</tr>
<tr>
<td>Sampaio[25]</td>
<td>-</td>
</tr>
<tr>
<td>Santos[22]</td>
<td>+</td>
</tr>
<tr>
<td>Senna[23]</td>
<td>+</td>
</tr>
<tr>
<td>Silval [24]</td>
<td>+</td>
</tr>
</tbody>
</table>
Legend:
+ = criterion was met; - = criterion was not met; ? = uncertain.
(1) adequacy of sampling; (2) sample size calculation; (3) sufficient response rate; (4) low potential for recall bias; (5) use of a validated measurement to ascertain chronic musculoskeletal disorders.

(Table 3 is an additional file)