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6

Spinal pain and its impact on older peopleManuela L. Ferreira ^{a,*}, Katie de Luca ^{a,b}^a *Institute of Bone and Joint Research, The Kolling Institute, Sydney Medical School, The University of Sydney, Sydney, Australia*^b *Private Practice, South West Rocks, NSW, Australia***A B S T R A C T****Keywords:**

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The term 'spinal pain' collectively includes the cervical, thoracic and lumbosacral regions of the spine. The majority of older people experience spinal pain, and with an increasing proportion of older people, the prevalence of spinal conditions are expected to increase in the coming decades. Musculoskeletal conditions of the spine in the older patient commonly include osteoarthritis and spinal stenosis, and the result of these degenerative diseases includes pain, stiffness and a decreased ability to engage in everyday activities. More than just the burden of pain, spinal pain has a significant considerable impact on the wellbeing and independence of older people within the community. Spinal pain is poorly managed, and knowledge of safe and effective treatment strategies are lacking because of the exclusion of older people in clinical research. Spinal pain in older people is a global health problem; the physical and personal impact of spinal directly threatens efforts to support healthy ageing.

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Introduction

Age is a common risk factor for all musculoskeletal conditions. Of particular importance are conditions of the spine, namely the cervical, thoracic and lumbosacral regions. With an increasing proportion of older people globally, the prevalence of spinal conditions are expected to increase in the coming decades, becoming a major global health problem. The general belief was that spinal pain is

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Practice points

- Spinal pain is common and more debilitating in older people, compared to younger adults.
- Contrary to common belief, spinal pain in older people is rarely caused by specific pathology.
- The impact of spinal pain in the older patient include impaired mobility and decreased social participation for the majority of patients.
- Older patients with spinal pain are more likely to present with comorbidities, cardiovascular diseases being the most common, affecting the choice of and response of treatments.

Research agenda

- Older people are largely under-represented in clinical research of low back pain, contributing to poor health care management.
- There is paucity of evidence on the risk factors and course of low back pain in the older patient, and we urgently need high-quality research to guide more efficient, cost-effective, and patient-centred health care of spinal pain in older people.

more common in older age because of pathophysiological changes such as tissue degeneration, muscle weakness and the decline of physical capacity. Recent systematic reviews [1,2] however, have challenged that view and shown that the prevalence of non-specific spinal pain in later years is no more common when compared to the middle-aged population. What is of interest is that when older people experience spinal pain, it is more severe, is more disabling and has a substantial impact on personal wellbeing. Spinal pain in older people is an under-researched area and, as such, older people with spinal pain are poorly managed. Comorbid conditions such as cardiovascular disease, diabetes and depression exist in association with spinal pain, and the management of the older patient is complex.

This chapter outlines common causes of spinal pain and reports the prevalence of regional and multi-site spinal pain in older people. This chapter also shares the findings of large-scale epidemiological data such as the Back Complaints in the Elders (BACE) international consortium [3] and the Back pain Outcomes using Longitudinal Data (BOLD) studies. The impact of spinal pain is then discussed in terms of pain and disability, comorbidities, including sleep disturbances, personal burden, and health care management.

Methods

This is a narrative review of relevant peer-reviewed and grey literature. Search terms used were those relevant to spinal pain (neck pain, thoracic pain, low back pain, spinal pain), impact (disability, quality of life, comorbidity, depression, independence) and ageing (age, older people, elderly). Physiological (osteoarthritis, rheumatologic, spinal stenosis, pathology) and epidemiological (prevalence, risk factors, course) search terms were also used to identify literature of importance. Upon full text retrieval, the bibliographies of publications were searched and literature further retrieved. Both authors contributed to the writing of the manuscript, which followed a structured approach to synthesising the literature and writing the review.

Causes of spinal pain in the older patient*Osteoarthritis of the spine and degenerative joint disease*

Osteoarthritis (OA) of the spine involves the degeneration of the paired diarthrodial joints in the posterior aspect of the vertebral column, known as the synovial facet joints [4]. Together with the

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intervertebral disc, the facet joints form the 'spinal motion segment' [4]. Radiographic hallmarks of facet joint OA include narrowing of the facet joint space, subarticular bone erosions, subchondral cysts, osteophyte formation, and hypertrophy of the articular process [5]. Pathologically, failure of the facet joints involves not only the bone but also surrounding musculoskeletal structures such as the cartilage, ligaments, capsule, synovium, and periarticular paraspinal muscles and soft tissues. Because of the close relationship within the spinal motion segment, facet joint OA is frequently associated with degenerative disc disease [6–8]. There is a close interplay between the load-bearing structures; the disc is the primary load-bearing structure; however, with severe disc degeneration, up to 70% of the axial load can be borne by the facet joints [9]. In support of the interdependence between the two structures, facet joint OA in the lumbar spine occurs at levels most commonly affected by disc degeneration. In older adults, degenerative facet joints were found in 80% of individuals, with most at the L4-L5 level [10]. Amongst community-dwelling adults in the Framingham Heart Study, moderate or severe lumbar facet joint OA on computerised tomography (CT) imaging was present in 89% of those age 65 years and older [11]. In a community-based US study, cervical facet joint OA was prevalent in 57% of adults aged 65 years and older [12].

With an increasing prevalence of spinal pain, there has been a steady rise in the use of plain film radiography, irrespective of age. Whilst imaging techniques are used to diagnose spinal OA, clinical decisions correlating radiographic findings and spinal pain are complex and poorly understood. In a study of the lumbar spine radiographic features, Goode et al. [13] found only disc space narrowing significantly associated with low back symptoms. Rudy et al. [14] found that pain level, headaches, referral of pain into the shoulder, and hand radiculopathy or numbness were not reliably correlated with radiographic findings of degenerative joint disease in the cervical spine. Hence, there are discrepancies between the degree of degeneration and the report of pain. Whilst a recent study reported that lumbar intervertebral disc degeneration was positively correlated with disability [15], these findings conflicted previous results that showed no association between lumbar disc degeneration and pain, disability and functional outcomes [16] or prognosis in this population [17]. In a thorough evaluation of spinal degeneration through CT, the therapeutic consequences of detecting degenerative changes were deemed minor, except in symptomatic spinal stenosis [18]. While the prevalence of OA and degenerative disc disease increase with age, pain severity and disability do not justify diagnostic imaging in older people [17,19]. Future guidelines should work towards appropriate recommendations for the use of diagnostic imaging for spinal pain in older people, with clinical management to focus on decreasing pain and improving disability and quality of life in symptomatic spinal pain patients.

The prevalence of spinal OA and disc degeneration is known to increase with age [20], with both spinal conditions being common causes of neck and back pain in older people. The pathoanatomical changes at the spinal segment result in stiffness, pain and poor joint function [10]. Even though more than 80% of older persons have some form of spinal degeneration, more research is needed on the risk factors, prognosis, course, biological markers and pain phenotypes of spinal pain.

Spinal stenosis

Symptomatic lumbar spinal stenosis (LSS) is a common degenerative condition of the spine, leading to significant pain, disability, and functional limitations [21,22]; in fact, it is considered the most disabling spinal condition and typically affects the older patient. Spinal stenosis occurs when the spinal canal narrows and compresses the spinal cord and nerves in the lumbar spine and can be either central (the narrowing of the entire canal) or foraminal stenosis (the narrowing of the foramen through which the nerve root exits the spinal canal) [23]. The prevalence of symptomatic LSS is estimated to be 47% in people older than 60 years [24]. Despite the belief that this is a condition of progressive worsening [25], the course of spinal stenosis in untreated or conservatively treated patients can be favourable [25,26]. Clinical practice guidelines endorse pain medication, education on the prognosis of the condition and advice to remain active as first-line care for patients with lumbar spinal canal stenosis. Patients are, however, often referred to surgery [27]. Symptomatic LSS is currently the most common reason for spine surgery in patients older than 65 years [28].

Serious pathology

Research has shown that in older adults, low back pain is not normally due to serious pathology. Of 669 older patients (aged >55 years) consulting their general practitioner, 6% were diagnosed with a serious underlying pathology during a 1-year follow-up [29], of which 5% (33 people) were diagnosed with vertebral fracture. Advanced age (>75 years), history of trauma, presence of osteoporosis, severe pain (≥ 7) and presence of thoracic pain were significantly associated with a positive diagnosis of vertebral compression fracture. In older people, history of trauma was the highest positive predictive factor for vertebral fracture. These findings are consistent with the presentation of low back pain in primary care, in which serious pathology is rare [30].

Prevalence and course of regional spinal pain in older people

Neck pain

Neck pain is defined as 'pain in the neck with or without pain referred into one or both upper limbs that lasts for at least 1 day'. The 1-year prevalence of neck pain in older people ranges between 9% and 12% [31–34]. In a study of older Korean community residents, women had a higher prevalence of neck pain, with gender, obesity and smoking significantly associated with neck pain [35].

Thoracic pain

A systematic review on the prevalence of musculoskeletal problems in older people in developed countries [36] has reported the results of three studies including older patients with thoracic pain. A 3-month prevalence was used in two studies, and estimates ranged between 2% [37] and 15% [38].

Low back pain

The most prevalent health condition in older adults leading to functional limitations and disability is low back pain. A new episode of low back pain is defined as a primary complaint of pain between the 12th rib and the buttock crease, with or without leg pain, causing the patient to seek health care or take medication and preceded by a period of at least 1 month without back pain [39]. Several population-based studies have estimated that the 1-year prevalence of low back pain in community-dwelling older adults ranges from 13% to 50% [40,41]. In Australia, the prevalence of back pain was 27% among people aged 65–74, with the prevalence declining slightly to 24% among people aged 75 and older. Italian researchers reported low back pain prevalence of 32% in adults aged 65 years and older [42], and a study of community-dwelling adults aged 70–79 years in the United States reported a low back pain prevalence of 36%.

In a systematic review of low back complaints in older adults, 37–40% of older adults still had low back complaints 3 months from baseline, and at 12 months, the percentage ranged from 26% to 45% [43]. Five studies were described in seven articles, with only one study dedicated to the study of low back pain in older adults, aged 69–85 years [44].

Prevalence of multi-site spinal pain in older people

Spinal pain (cervical, thoracic or lumbar pain) is common, has a substantial socioeconomic burden [45,46] and constitutes the locus of pain in the majority of patients in chronic pain settings [47]. Whilst the vast majority of musculoskeletal pain research is focused towards regional spinal pain, much less is known about the aetiology of multi-site spinal pain and the extent of the socioeconomic costs of spinal pain.

In a report by Manchikanti et al. [47], the lifetime prevalence of multi-site spinal pain was reported to be between 54% and 80%. Leboeuf-Yde conducted a cross-sectional survey on 34,902 Danish twins and found that 69% reported spinal pain, with 55% reporting spinal pain in the past year [48]. In an

Australian study, 55.8% of community-dwelling older women, aged 61–66 years, reported spinal pain [49]. Slightly less, in the US, the lifetime prevalence of spinal pain in older people (60 years and older) was 36.6%, with 21.6% reporting chronic spinal pain in the past year [50].

Course of spinal pain in older people

There are now internationally collaborative efforts to improve the understanding of the course and prognosis of spinal pain in older adults. The Back Complaints in the Elders (BACE) international consortium was established to compare the course and prognostic factors of low back pain across different countries and investigate the influence of health care systems on the treatment of lower back complaints [3]. Low back pain was defined as pain in the region from the top of the scapulae to the first sacral vertebra. It is conducted in the Netherlands, Brazil and Norway. The Dutch cohort found that the baseline variables of longer duration of low back pain, severity of low back pain, history of low back pain, an absence of radiating pain in the leg below the knee, increased number of comorbidities, patients' expectation of non-recovery and decreased mobility were significantly associated with non-recovery at 3 months [51].

The Back pain Outcomes using Longitudinal Data (BOLD) is a prospective inception cohort of 5239 patients aged 65 years and older initiating a new episode of care for low back pain [52]. Back pain was defined using the Ninth International Classification of Diseases (ICD-9) codes, with any of 57 codes for thoracic and lumbar pain, degenerative spinal disorders and vertebral fractures included [52,53]. In an analysis of 5211 older adults who had reached the 12-month follow-up date, more than 75% of older adults reported persistent back pain [54]. After initial improvements in pain after 3 months, pain and activity interference changed minimally until follow-up. There was mild but progressive improvement in disability over the 12 months [54]. The data from this study suggest that persistent pain, disability and interference with activity are problematic for the vast majority of older adults, even after 12 months. Deyo et al. identified six distinct trajectories, with four subgroups showing minimal improvement in back pain and two subgroups showing substantial improvements in back pain over 12 months [53]. No studies on the course and prognosis of neck pain in older adults have been identified.

Impact of spinal pain on the older patient

Pain and disability

People 65 years of age or older are more likely to present moderate to severe chronic episodes of spinal pain, and this pain is more likely to be incapacitating when compared to younger adults [2,55]. The population-based MUSICIAN study has included cross-sectional data on 15,222 adults aged 25 years or older and reported that one in every four patients older than 80 years will report moderate to severe low back pain. Adults aged 80 years and older are also three times more likely to have high-intensity low back pain (scores >50 on a zero to 100 percentile index) than those aged 50–59 years [56]. Findings from the Dutch BACE cohort indicate persons aged ≥ 75 years report significantly higher pain scores and more musculoskeletal complaints than persons aged >55–74 years [57]. Older age is a significant predictor of non-recovery from an episode of low back pain [58].

Spinal pain in older people will substantially affect their physical function and quality of life. Again, the MUSICIAN study has shown that those aged over 80 years are twice more likely to be disabled by an episode of back pain than those aged 25–40 years [59], and approximately one-fifth of adults aged 80 years and older who report low back pain also reporting difficulties in caring for themselves at home or participating in family and social activities. In general, the older patient with chronic low back pain has greater difficulty in performing activities of daily living (ADLs) and greater physical function limitation than age-matched controls [60]. For instance, in older women, low back pain has been linked to reported difficulty in performing basic and instrumental ADLs (e.g. lifting, housework, shopping) [61]. Older adults with low back pain, with or without accompanying leg pain, are twice more likely to experience a fall and face increased difficulty in lifting (e.g. grocery bags), walking or bathing themselves [33,62] and lifting objects, housework, climbing stairs and walking

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than older patients without pain [63]. The impact of low back pain on disability is also more accentuated with increased age for older people. The Dutch BACE cohort study has examined 675 adults 55 years and older with a new episode of low back pain and shown that patients aged 75 years or older experience more disability (mean: 12.1; SD: 5.5 on 0–24 point disability scale) and lower quality of life than those aged 55–74 years (mean: 9.4; SD: 5.8) [57]. The severe activity limitation and disability will quickly result in substantial decrease in social participation and quality of life for the older patient. In a recent study from Australia, older women with spinal pain were shown to have significantly lower scores in all eight domains of the SF-36, resulting in poorer health status and affecting the ability of women to engage in social activities with family, friend and groups, and this results in feelings of anxiety and incapability [49]. These findings were consistent also with those of Boakye et al., who found that spinal disorders have a severe impact on physical and emotional health-related quality of life in veterans measured by the SF-12 [64]. Low back pain is the most common health condition that forces older workers to retire involuntarily, increasing substantially the financial burden of the disease due to work loss [65]. Early retirement due to low back pain also results in long-term loss of financial capacity and reduced wealth [43].

Personal burden

Whilst past research has largely focused on the societal impact of spinal pain in the older patient, only few qualitative studies have investigated the personal burden of spinal pain in this population. In general, these studies suggest that older patients with low back pain will report having a negative perception of themselves, due to their reduced physical capacity, both in society and at home. They voice feelings of being unable to adequately perform their social roles around family, friends and work [66]. In their family environment, patients with low back pain find this condition significantly affects their relationship with their spouse or partner, given the strain of additional roles assumed by the latter and the resulting emotional distress [67]. This is also often voiced by partners of patients with chronic low back pain who report feelings of helplessness and frustration [68]. Similarly, low back pain greatly affects the older patient's role as a parent and grandparent, indicating that the impact of this condition endures along multiple generations [67]. Low back pain also alters patients' sense of self and their self-image, mainly as a result of hypervigilance and fear of re-injury and symptom aggravation [69].

Depression and cognitive impact

Several epidemiological studies have found that the presence of spinal pain in older people is strongly associated with depression and other mental disorders [57,70–72]. Older patients with chronic low back pain report higher levels of depressive symptoms than age-matched controls [60]. A probability sample of US adults has shown that among the 40 million Americans with chronic spinal pain, almost 14 million (or 35%) were found to have a current mood, anxiety or substance use disorder, with major depression being the most common specific mental disorder among persons with chronic spinal pain [50]. Moreover, the same study has shown the prevalence of chronic spinal pain is nearly twice as high among respondents with a mental disorder compared to those without [50]. A retrospective analysis of administrative outpatient data in the US also revealed that the presence of depression associated with low back pain increases the likelihood of an inpatient admission by 27% (95%CI: 1.13 to 1.46) [73].

In addition to depressive symptoms, older patients report more negative beliefs and fear of movement due to low back pain than the younger patient [57]. Importantly, higher levels of disability, depressive symptoms and fear of movement due to low back pain are also significant predictors of non-recovery at 4 months among older people with low back pain [51].

Comorbidity and sleep disturbance

The older person with low back pain will often present with multimorbidity, which significantly adds to the disability and financial burden of the disease. The most prevalent musculoskeletal comorbidities among older patients with low back pain include neck and shoulder (52%), knee (46%),

and hip complaints (41%) [57]. Cardiovascular diseases are also common, and approximately one-third (37%) of patients 55 years of age or older will have high blood pressure (50% for those aged 75 years or older), one in seven will have heart disease (29% for those aged 75 years or older), and one in eight will have diabetes (17% for those aged 75 years or older) [57]. The consequence is poorer prognosis in terms of recovery and increased health care use [74]. For instance, presence of musculoskeletal comorbidities increases the risk of non-recovery by almost three times among older individuals with low back pain (OR: 2.6; 95%CI: 1.8 to 3.9), and with every additional (non-musculoskeletal) comorbidity, there is a 40% increase in the risk of developing persistent low back pain (OR: 1.4; 95%CI: 1.3 to 1.5) [51]. The presence of heart disease and diabetes will increase the likelihood by 72% (95%CI: 1.53 to 1.94) and 102% (95%CI: 1.69 to 2.40), respectively [73]. Data from a cross-sectional study of 579 community-dwelling older Australian women reported that spinal pain was significantly associated with being overweight/obesity, having diabetes, pulmonary comorbidity, mental comorbidity and cardiovascular comorbidity. Over half of the women with spinal pain reported two or more comorbidities, with the number of comorbidities being significantly more common among women with spinal pain than women without spinal pain. Of particular interest, the odds of spinal pain increased with an increasing in the number of comorbidities. Compared to no comorbidities, having one, two, three or four comorbidities was significantly associated with a 1.4, 2.4, 3.1 and 5.1 increase in the adjusted odds of having spinal pain, respectively.

Moreover, Rudy et al., [60] found that older adults with chronic low back pain have statistically significant lower sleep quality, indicated by higher scores on the Pittsburgh Sleep Quality Index. Older adults with severe, persistent spinal pain are twice as likely to report difficulties in initiating sleep, in staying asleep and with sleeping longer than usual, after adjusting for the presence of other comorbid health conditions and anxiety [75]. Whilst this study highlights the relationships between chronic musculoskeletal pain and sleep, there is currently no dedicated programme of study to investigate the impact of spinal pain on sleep. Similarly, the mechanism of spinal pain as a contributor to dysregulated physiological mechanisms still needs to be elucidated. Spinal pain seems to carry a greater burden of disease than simply the symptoms and disability of pain for the older patient.

Personal burden

Studies have begun to report the impact of spinal pain upon objective outcomes of pain and disability; however, the personal burden related to spinal pain remains relatively unknown. Few studies have investigated the qualitative aspect of the impact of spinal pain and, in particular, the magnitude of the effect on psychosocial and affective domains. Low back pain is also associated with a 10-fold higher odds of reporting difficulty of social interaction [33]. Patients with back pain often report having a negative perception of themselves because of their reduced physical capacity, both at work and at home. They voice feelings of being unable to adequately perform their social roles around family, friends and work [66]. In their family environment, patients with low back pain find this condition significantly affects their relationship with their spouse or partner, given the strain of additional roles assumed by the latter and the resulting emotional distress [67]. Additionally, partners of patients with chronic low back pain also report feelings of helplessness and frustration [68]. Low back pain greatly affects the patient's role as a parent and grandparent, affecting multiple generations [67]. Low back pain also alters patients' sense of self and their self-image, mainly as a result of hypervigilance and fear of re-injury and symptom aggravation [69].

Impact of spinal pain on older patient of low- to mid-income countries

The impact of spinal pain on the older patient is global and not restricted to high-income countries. In fact, the World Health Organization (WHO) study on global ageing and adult health (SAGE) has pooled data on adults aged 50 years and older from six low- to mid-income countries (China, Russia, South Africa, Ghana, Mexico and India), showing an overall prevalence of low back pain in the past month of 30% (ranging from 22% in China to 56% in Russia), with most participants with low back pain (77.2%) reporting at least moderate levels of symptom severity [76]. Naturally, pain severity was strongly associated with disability in this population (OR: 18.6; 95%CI: 16.5 to 20.6 for high levels of

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pain intensity), as was lower education, lower wealth and greater number of comorbidities [76]. A survey of 301 housewives from rural India has shown that 94% of women aged 70 years or older with low back pain report severe to very severe pain-related disability [77]. From a patient's perspective, this may represent for the older patient from low- to mid-income countries decreased social identity because of difficulty in participating in traditional duties and reduced financial subsistence or capacity to provide for family [78].

Spinal pain management for the older patient

The results of the MUSICIAN study suggest that older people with low back pain are likely to have worse outcomes as they receive less adequate management than younger adults [59]; while we know that older people are more likely to have co-morbidities and be more disabled by their back pain, their GPs tend to confine treatment to the prescription of pain medicines. Patients older than 70 years of age and seeking primary care for low back pain are almost 70% more likely (95%CI: 1.24 to 2.25) to receive a prescription for pain killers only and almost 50% less likely (95%CI: 0.47 to 0.86) to be advised about physiotherapy or other exercise, compared to younger adults with low back pain [59]. This is a surprising finding, given older patients will present with higher number of comorbidities and, accordingly, are at a higher risk of polypharmacy, i.e. long-term use of 5 or more regular medicines [79], and the adverse events associated with it, including increased risk of confusion, incontinence [79], falls, frailty and mortality [80].

The most commonly prescribed analgesics for older adults with back pain include non-steroidal anti-inflammatory drugs (NSAIDs) (57%) and paracetamol (49%) [51,57]. Although there is a slight decline in the use of analgesics over time, about one-third of older people are still on analgesics 6 months from their first primary care consultation for low back pain [51]. Patients aged between 75 and 84 years with low back pain are also four times more likely to be admitted to hospital for their pain (95%CI: 2.82 to 5.65), while those aged 85 years and older are nearly 6 times more likely to be hospitalised (OR: 5.46; 95%CI: 3.58 to 8.33) compared to younger adults with low back pain [73].

A relevant trend in the discussion of spinal pain management in the older patients is the increased use of complementary and alternative medicine (CAM) use by older adults. Whilst the definition of a CAM modality frequently varies between studies, its use is frequent. In older German adults, 61.3% used any type of CAM [81], similar to that of older US adults in which 62.9% reported the use of one or more CAM modalities [82]. CAM was perceived to have a good effect (58.7%) [82] and satisfaction was high (80%) [81].

Clinical practice guidelines for the management of low back pain in primary care have been produced by countries such as the UK [83], the USA [84] and Australia [85], however, are largely silent on specific recommendations for the older patient. Recently, the British Geriatric Society and British Pain Society have collaborated to produce the first UK guideline on the management of pain in older people [86]. However, evidence on the effectiveness of low back pain management for older patients is scarce as randomised clinical trials systematically exclude participants older than 65 years of age [87]. This is the case for most trials of conservative care. For example, from a 2011 Cochrane review that assessed the efficacy of combined chiropractic interventions for low back pain, 6 of the 12 studies explicitly excluded participants over 60 years [88]. In another Cochrane review that assessed non-operative treatment for chronic low back pain, older people were commonly excluded from the included trials again [89]. There is an urgent need for better professional education programmes, future research dedicated to help guide clinical practice and better pain management strategies that specifically target the special needs of the older person with spinal pain in our community [90].

Conclusions

Contrary to general belief, spinal pain is not always the result of serious pathology and/or severe tissue degeneration in the older patient, but there is compelling evidence that pain is more severe and debilitating in older age, when compared to younger adults. The long-term impact of spinal pain in this population is significant in terms of reduced capacity to perform activities of daily life, impaired mobility, and decreased social participation and overall quality of life for the majority of patients.

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Feelings of being unable to perform normal social roles around family, friends and work are also common, resulting in substantial emotional stress and increased risk of chronic disability. Older patients with spinal pain are also more likely to present with numerous comorbidities, cardiovascular diseases being the most common, affecting the choice and response of treatments. Older people are, however, largely under-represented in clinical research of low back pain, contributing to poor health care management: older patients are more likely to receive unsafe, ineffective and complex management, including early diagnostic imaging, surgery and strong opioids. There is urgent need for funding high-quality research to guide more efficient, cost-effective and patient-centred health care of spinal pain in older people.

Conflict of interest statement

The authors declare they hold no financial or personal relationships with other people or organisations that could inappropriately influence (bias) the content of this article.

References

- [1] Fejer R, Leboeuf-Yde C. Does back and neck pain become more common as you get older? A systematic literature review. *Chiropr Man Ther* 2012;20(1):24.
- [2] Dionne CE, Dunn KM, Croft PR. Does back pain prevalence really decrease with increasing age? A systematic review. *Age Ageing* 2006;35(3):229–34.
- [3] Scheele J, Luijsterburg PA, Ferreira ML, et al. Back complaints in the elders (BACE); design of cohort studies in primary care: an international consortium. *BMC Musculoskelet Disord* 2011;12:193.
- [4] Gellhorn AC, Katz JN, Suri P. Osteoarthritis of the spine: the facet joints. *Nat Rev Rheumatol* 2013;9(4):216–24.
- [5] Pathria M, Sartoris DJ, Resnick D. Osteoarthritis of the facet joints: accuracy of oblique radiographic assessment. *Radiology* 1987;164(1):227–30.
- [6] Kalichman L, Li L, Kim DH, et al. Facet joint osteoarthritis and low back pain in the community-based population. *Spine* 2008;33(23):2560–5.
- [7] Gellhorn AC. Cervical facet-mediated pain. *Phys Med Rehabil Clin N. Am* 2011;22(3):447–58. viii.
- [8] Fujiwara A, Tamai K, Yamato M, et al. The relationship between facet joint osteoarthritis and disc degeneration of the lumbar spine: an MRI study. *Eur Spine J Off Publ Eur Spine Soc Eur Spinal Deform Soc Eur Sect Cerv Spine Res Soc* 1999; 8(5):396–401.
- [9] Adams MA, Hutton WC. The mechanical function of the lumbar apophyseal joints. *Spine* 1983;8(3):327–30.
- [10] Tischer T, Aktas T, Milz S, Putz RV. Detailed pathological changes of human lumbar facet joints L1–L5 in elderly individuals. *Eur Spine J Off Publ Eur Spine Soc Eur Spinal Deform Soc Eur Sect Cerv Spine Res Soc* 2006;15(3):308–15.
- [11] Suri P, Miyakoshi A, Hunter DJ, et al. Does lumbar spinal degeneration begin with the anterior structures? A study of the observed epidemiology in a community-based population. *BMC Musculoskelet Disord* 2011;12:202.
- [12] Dodge HJ, Mikkelsen WM, Duff IF. Age-sex specific prevalence of radiographic abnormalities of the joints of the hands, wrists and cervical spine of adult residents of the Tecumseh, Michigan, Community Health Study area, 1962–1965. *J Chronic Dis* 1970;23(3):151–9.
- [13] Goode AP, Marshall SW, Renner JB, et al. Lumbar spine radiographic features and demographic, clinical, and radiographic knee, hip, and hand osteoarthritis. *Arthritis Care Res* 2012;64(10):1536–44.
- [14] Rudy IS, Poulos A, Owen L, et al. The correlation of radiographic findings and patient symptomatology in cervical degenerative joint disease: a cross-sectional study. *Chiropr Man Ther* 2015;23:9.
- [15] Middendorp M, Vogl TJ, Kollias K, et al. Association between intervertebral disc degeneration and the Oswestry disability index. *J Back Musculoskelet Rehabil* 2016;30(4):819–23.
- [16] Corniola MV, Stienen MN, Joswig H, et al. Correlation of pain, functional impairment, and health-related quality of life with radiological grading scales of lumbar degenerative disc disease. *Acta Neurochir* 2016;158(3):499–505.
- [17] Jarvik JG, Gold LS, Comstock BA, et al. Association of early imaging for back pain with clinical outcomes in older adults. *JAMA* 2015;313(11):1143–53.
- [18] Kalichman L, Kim DH, Li L, et al. Computed tomography-evaluated features of spinal degeneration: prevalence, inter-correlation, and association with self-reported low back pain. *Spine J Off J N Am Spine Soc* 2010;10(3):200–8.
- [19] Taylor JA, Bussieres A. Diagnostic imaging for spinal disorders in the elderly: a narrative review. *Chiropr Man Ther* 2012; 20(1):16.
- [20] de Schepper EI, Damen J, van Meurs JB, et al. The association between lumbar disc degeneration and low back pain: the influence of age, gender, and individual radiographic features. *Spine* 2010;35(5):531–6.
- [21] Ammendolia C, Stuber KJ, Rok E, et al. Nonoperative treatment for lumbar spinal stenosis with neurogenic claudication. *Cochrane Database Syst Rev* 2013;8, CD010712.
- [22] Deyo RA. Treatment of lumbar spinal stenosis: a balancing act. *Spine J* 2010;10(7):625–7.
- [23] Djurasovic M, Glassman SD, Carreon LY, Dimar 2nd JR. Contemporary management of symptomatic lumbar spinal stenosis. *Orthop Clin N Am* 2010;41(2):183–91.
- [24] Kalichman L, Cole R, Kim DH, et al. Spinal stenosis prevalence and association with symptoms: the Framingham Study. *Spine J* 2009;9(7):545–50.
- [25] Johnsson KE, Rosen I, Uden A. The natural course of lumbar spinal stenosis. *Clin Orthop Relat Res* 1992;279:82–6.

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- [26] Herno A, Airaksinen O, Saari T, Luukkonen M. Lumbar spinal stenosis: a matched-pair study of operated and non-operated patients. *Br J Neurosurg* 1996;10(5):461–5.
- [27] NASS Evidence-Based Clinical Guidelines Committee. *Diagnosis and treatment of degenerative lumbar spinal stenosis*. 2011. Illinois, USA.
- [28] Deyo RA, Gray DT, Kreuter W, et al. United States trends in lumbar fusion surgery for degenerative conditions. *Spine* 2005;30(12):1441–5.
- [29] Enthoven WT, Geuze J, Scheele J, et al. Prevalence and “red flags” regarding specified causes of back pain in older adults presenting in general practice. *Phys Ther* 2016;96(3):305–12.
- [30] Henschke N, Maher CG, Refshauge KM, et al. Prevalence of and screening for serious spinal pathology in patients presenting to primary care settings with acute low back pain. *Arthritis Rheum* 2009;60(10):3072–80.
- [31] Andrianakos A, Trontzas P, Christoyannis F, et al. Prevalence of rheumatic diseases in Greece: a cross-sectional population based epidemiological study. The ESORDIG Study. *J Rheumatol* 2003;30(7):1589–601.
- [32] Chiu TT, Leung AS. Neck pain in Hong Kong: a telephone survey on prevalence, consequences, and risk groups. *Spine* 2006;31(16):E540–4.
- [33] Hicks GE, Gaines JM, Shardell M, Simonsick EM. Associations of back and leg pain with health status and functional capacity of older adults: findings from the retirement community back pain study. *Arthritis Rheum* 2008;59(9):1306–13.
- [34] Vogt MT, Simonsick EM, Harris TB, et al. Neck and shoulder pain in 70- to 79-year-old men and women: findings from the health, aging and body composition study. *Spine J Off J N Am Spine Soc* 2003;3(6):435–41.
- [35] Son KM, Cho NH, Lim SH, Kim HA. Prevalence and risk factor of neck pain in elderly Korean community residents. *J Korean Med Sci* 2013;28(5):680–6.
- [36] Fejer R, Ruhe A. What is the prevalence of musculoskeletal problems in the elderly population in developed countries? A systematic critical literature review. *Chiropr Man Ther* 2012;20(1):31.
- [37] Parsons S, Breen A, Foster NE, et al. Prevalence and comparative troublesomeness by age of musculoskeletal pain in different body locations. *Fam Pract* 2007;24(4):308–16.
- [38] Miro J, Paredes S, Rull M, et al. Pain in older adults: a prevalence study in the Mediterranean region of Catalonia. *Eur J pain* 2007;11(1):83–92.
- [39] de Vet HC, Heymans MW, Dunn KM, et al. Episodes of low back pain: a proposal for uniform definitions to be used in research. *Spine* 2002;27(21):2409–16.
- [40] Leopoldino AA, Diz JB, Martins VT, et al. Prevalence of low back pain in older Brazilians: a systematic review with meta-analysis. *Rev Bras Reumatol Engl Ed* 2016;56(3):258–69.
- [41] Woo J, Leung J, Lau E. Prevalence and correlates of musculoskeletal pain in Chinese elderly and the impact on 4-year physical function and quality of life. *Public health* 2009;123(8):549–56.
- [42] Cecchi F, Debolini P, Lova RM, et al. Epidemiology of back pain in a representative cohort of Italian persons 65 years of age and older: the InCHIANTI study. *Spine* 2006;31(10):1149–55.
- [43] Scheele J, Luijsterburg PA, Bierma-Zeinstra SM, Koes BW. Course of back complaints in older adults: a systematic literature review. *Eur J Phys Rehabil Med* 2012;48(3):379–86.
- [44] Matsunaga S, Ijiri K, Hayashi K. Nonsurgically managed patients with degenerative spondylolisthesis: a 10- to 18-year follow-up study. *J Neurosurg* 2000;93(2 Suppl):194–8.
- [45] Haldeman S, Carroll L, Cassidy JD. Findings from the bone and joint decade 2000–2010 task force on neck pain and its associated disorders. *J Occup Environ Med/Am Coll Occup Environ Med* 2010;52(4):424–7.
- [46] Kent PM, Keating JL. The epidemiology of low back pain in primary care. *Chiropr Osteopath* 2005;13:13.
- [47] Manchikanti L, Singh V, Datta S, et al. Comprehensive review of epidemiology, scope, and impact of spinal pain. *Pain Physician* 2009;12(4):E35–70.
- [48] Leboeuf-Yde C, Nielsen J, Kyvik KO, et al. Pain in the lumbar, thoracic or cervical regions: do age and gender matter? A population-based study of 34,902 Danish twins 20–71 years of age. *BMC Musculoskelet Disord* 2009;10:39.
- [49] de Luca K, Parkinson L, Haldeman S, et al. The relationship between spinal pain and comorbidity: a cross-sectional analysis of 579 community-dwelling, older, Australian women. *J Manip Physiol Ther* 2017. In Press.
- [50] Von Korff M, Crane P, Lane M, et al. Chronic spinal pain and physical-mental comorbidity in the United States: results from the national comorbidity survey replication. *Pain* 2005;113(3):331–9.
- [51] Scheele J, Enthoven WT, Bierma-Zeinstra SM, et al. Course and prognosis of older back pain patients in general practice: a prospective cohort study. *Pain* 2013;154(6):951–7.
- [52] Jarvik JG, Comstock BA, Bresnahan BW, et al. Study protocol: the back pain outcomes using longitudinal data (BOLD) registry. *BMC Musculoskelet Disord* 2012;13:64.
- [53] Deyo RA, Bryan M, Comstock BA, et al. Trajectories of symptoms and function in older adults with low back disorders. *Spine* 2015;40(17):1352–62.
- [54] Rundell SD, Sherman KJ, Heagerty PJ, et al. The clinical course of pain and function in older adults with a new primary care visit for back pain. *J Am Geriatr Soc* 2015;63(3):524–30.
- [55] Tamcan O, Mannion A, Eisenring C, et al. The course of chronic and recurrent low back pain in the general population. *Pain* 2010;150:451–7.
- [56] Stewart Williams J, Ng N, Peltzer K, et al. Risk factors and disability associated with low back pain in older adults in low- and middle-income countries. Results from the WHO study on global AGEing and adult health (SAGE). *PloS One* 2015;10(6), e0127880.
- [57] Scheele J, Enthoven WT, Bierma-Zeinstra SM, et al. Characteristics of older patients with back pain in general practice: BACE cohort study. *Eur J Pain* 2014;18(2):279–87.
- [58] Henschke N, Maher CG, Refshauge KM, et al. Characteristics of patients with acute low back pain presenting to primary care in Australia. *Clin J pain* 2009;25(1):5–11.
- [59] Macfarlane GJ, Beasley M, Jones EA, et al. The prevalence and management of low back pain across adulthood: results from a population-based cross-sectional study (the MUSICIAN study). *Pain* 2012;153(1):27–32.
- [60] Rudy TE, Weiner DK, Lieber SJ, et al. The impact of chronic low back pain on older adults: a comparative study of patients and controls. *Pain* 2007;131(3):293–301.

- [61] Leveille SG, Guralnik JM, Hochberg M, et al. Low back pain and disability in older women: independent association with difficulty but not inability to perform daily activities. *J Gerontol Ser A Biol Sci Med Sci* 1999;54(10):M487–93.
- [62] Edmond SL, Felson DT. Function and back symptoms in older adults. *J Am Geriatr Soc* 2003;51(12):1702–9.
- [63] Weiner DK, Haggerty CL, Kritchevsky SB, et al. How does low back pain impact physical function in independent, well-functioning older adults? Evidence from the health ABC cohort and implications for the future. *Pain Med (Malden, Mass)* 2003;4(4):311–20.
- [64] Boakye M, Moore R, Kong M, et al. Health-related quality-of-life status in Veterans with spinal disorders. *Qual Life Res Int J Qual Life Asp Treat Care Rehabil* 2013;22(1):45–52.
- [65] Schofield D, Shrestha R, Passey M, et al. Chronic disease and labour force participation among older Australians. *Med J Aust* 2008;189:447–50.
- [66] Bailly F, Foltz V, Rozenberg S, et al. The impact of chronic low back pain is partly related to loss of social role: a qualitative study. *Jt Bone Spine Rev du Rhum* 2015;82(6):437–41.
- [67] De Souza L, Frank AO. Patients' experiences of the impact of chronic back pain on family life and work. *Disabil Rehabil* 2011;33(4):310–8.
- [68] Miller J, Timson D. Exploring the experiences of partners who live with a chronic low back pain sufferer. *Health Soc Care Community* 2004;12(1):34–42.
- [69] Crowe M, Whitehead L, Gagan MJ, et al. Listening to the body and talking to myself – the impact of chronic lower back pain: a qualitative study. *Int J Nurs Stud* 2010;47(5):586–92.
- [70] Reid MC, Williams CS, Concato J, et al. Depressive symptoms as a risk factor for disabling back pain in community-dwelling older persons. *J Am Geriatr Soc* 2003;51(12):1710–7.
- [71] Hartvigsen J, Christensen K. Pain in the back and neck are with us until the end: a nationwide interview-based survey of Danish 100-year-olds. *Spine* 2008;33(8):909–13.
- [72] Docking RE, Fleming J, Brayne C, et al. Epidemiology of back pain in older adults: prevalence and risk factors for back pain onset. *Rheumatology* 2011;50(9):1645–53.
- [73] Ritzwoller DP, Crouse L, Shetterly S, Rublee D. The association of comorbidities, utilization and costs for patients identified with low back pain. *BMC Musculoskelet Disord* 2006;7:72.
- [74] Hartvigsen J, Natvig B, Ferreira M. Is it all about a pain in the back? *Best Pract Res Clin Rheumatol* 2013;27(5):613–23.
- [75] Chen Q, Hayman LL, Shmerling RH, et al. Characteristics of chronic pain associated with sleep difficulty in older adults: the maintenance of balance, independent living, Intellect, and zest in the elderly (MOBILIZE) Boston study. *J Am Geriatr Soc* 2011;59(8):1385–92.
- [76] Sigmundsson FG, Jonsson B, Stromqvist B. Impact of pain on function and health related quality of life in lumbar spinal stenosis. A register study of 14,821 patients. *Spine* 2013;38(15):E937–45.
- [77] Gupta G, Nandini N. Prevalence of low back pain in non working rural housewives of Kanpur, India. *Int J Occup Med Environ Health* 2015;28(2):313–20.
- [78] Hondras M, Hartvigsen J, Myburgh C, Johannessen H. Everyday burden of musculoskeletal conditions among villagers in rural Botswana: a focused ethnography. *J Rehabil Med* 2016;48(5):449–55.
- [79] Hilmer SN, Gnjjidic D. The effects of polypharmacy in older adults. *Clin Pharmacol Ther* 2009;85(1):86–8.
- [80] Gnjjidic D, Hilmer SN, Blyth FM, et al. Polypharmacy cutoff and outcomes: five or more medicines were used to identify community-dwelling older men at risk of different adverse outcomes. *J Clin Epidemiol* 2012;65(9):989–95.
- [81] Schnabel K, Binting S, Witt CM, Teut M. Use of complementary and alternative medicine by older adults—a cross-sectional survey. *BMC Geriatr* 2014;14:38.
- [82] Cheung CK, Wyman JF, Halcon LL. Use of complementary and alternative therapies in community-dwelling older adults. *J Altern Complement Med* 2007;13(9):997–1006.
- [83] Low back pain and sciatica in over 16s: assessment and management. 2016 Nov. London: Nice.
- [84] Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med* 2007;147(7):478–91.
- [85] Rheumatology Expert Group. Therapeutic guidelines: rheumatology. Melbourne: Therapeutic Guidelines Limited; 2010., Version 2.
- [86] Abdulla A, Bone M, Adams N, et al. Evidence-based clinical practice guidelines on management of pain in older people. *Age Ageing* 2013;42(2):151–3.
- [87] Paeck T, Ferreira ML, Sun C, et al. Are older adults missing from low back pain clinical trials? A systematic review and meta-analysis. *Arthritis Care Res (Hob)* 2014;66(8):1220–6.
- [88] Walker BF, French SD, Grant W, Green SA. Cochrane review of combined chiropractic interventions for low-back pain. *Spine* 2011;36(3):230–42.
- [89] Rubinstein SM, van Middelkoop M, Assendelft WJ, et al. Spinal manipulative therapy for chronic low-back pain. *Cochrane database Syst Rev* 2011;20(2), CD008112.
- [90] Gibson SJ. Older people's pain. *Pain Clin Updat* 2006;14:1–4.

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