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REVIEW

Cardiovascular and lifestyle risk factors in lumbar radicular pain or clinically defined sciatica: a systematic review

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Abstract Lumbar radicular pain is a fairly common health problem, yet its risk factors are far from clear. There are no published systematic reviews on associations between cardiovascular or lifestyle risk factors and lumbar radicular pain or sciatica. The aim of this systematic literature review was to assess associations between these risk factors and lumbar radicular pain or sciatica. We conducted a systematic search of the Medline database for all original articles on lumbar radicular pain or sciatica published until August 2006. Twenty-two papers from 19 studies were included in the review. Overweight or obesity was associated with sciatica in most of the case-control and cohort studies. Some studies showed an increased risk of lumbar radicular pain in smokers with a long smoking history or in those with high levels of physical activity. A few case-control studies showed an association between serum C-reactive protein and sciatica. No consistent associations were found for serum lipids levels or high blood pressure. In summary, the associations of overweight, long smoking history, high physical activity and a high serum C-reactive protein level with lumbar radicular pain or sciatica were substantiated by the present review. However, more prospective studies are needed in order to further clarify these associations and the mechanisms of action.

Keywords C-reactive protein · Exercise · Lipids · Overweight · Smoking

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Introduction

Lumbar radicular pain (sciatic pain, radiating low back pain) is a fairly common health problem and a common cause of work disability [13, 27]. It is usually caused by compression or irritation of one of the lumbosacral nerve roots, and is a common symptom of lumbar disc herniation [13]. Straight leg raising restriction or other clinical signs of rhizopathy can be usually found in patients with disc herniation-induced radicular pain. If these clinical signs are observed, terms ''clinically defined sciatica'' or ''sciatic syndrome'' may be used.

The precise etiology of lumbar radicular pain is unclear. In addition to mechanical factors, inflammation is suggested to play a role [17]. Cardiovascular and lifestyle risk factors may also be important, as overweight, smoking and C-reactive protein have shown associations with sciatic pain [11, 26, 33]. Moreover, stenosis of lumbar arteries predicted disc space narrowing, suggesting an association between atherosclerosis and lumbar disc degeneration [21, 22]. However, associations between cardiovascular or lifestyle risk factors and lumbar radicular pain or sciatica have not been addressed in a systematic review.

The aim of this review was to examine associations between cardiovascular or lifestyle risk factors and lumbar radicular pain or clinically defined sciatica and to discuss possible mechanisms for observed associations. Understanding the underlying mechanisms may provide new insights for the prevention and treatment of these disorders.

Methods

Search strategy

Studies of interest were identified by searches of the Medline database through August 2006 using predefined keywords. The following search terms were used: back disorders, spinal diseases, low back pain, lumbar radicular pain, sciatic pain, sciatic syndrome, lumbosciatic syndrome, lumbosacral radicular syndrome, sciatica, intervertebral disk displacement, disc herniation, herniated lumbar disc, prolapsed lumbar disc, disc protrusion, and herniated nucleus pulposus. In the text below, we use the term ''lumbar radicular pain'' to refer to radiating low back pain, sciatic pain or lumbosciatic pain, and ''clinically defined sciatica'' or ''sciatic syndrome'' to clinician-diagnosed cases or to hospitalizations due to intervertebral disc disorders.

Cardiovascular or lifestyle risk factors of interest were smoking, physical inactivity, overweight, hypertension, dyslipidaemia, diabetes and inflammatory factors.

Abstracts were reviewed, and relevant articles obtained. Full text of all articles on lumbar radicular pain or sciatic syndrome and risk factor of interests were scrutinized. Reference lists of the identified articles were reviewed for additional studies.

Selection of studies

Two authors (RS, JK) independently examined relevant articles on lumbar radicular pain or clinically defined sciatica. We excluded reviews, case reports, letters, editorials, studies on solely clinical populations and case-control studies with clinical controls. We included original articles written in any language with a cohort, case-control (with controls derived from the normal population) or cross sectional design conducted in a human population.

Quality assessment

We assessed the quality of the studies using a modification of the Cochrane quality criteria for the systematic assessment of non-experimental studies [16]. We used a data abstraction form, and two reviewers independently evaluated each study and extracted data from unmasked articles. Disagreements were resolved by consensus.

We assessed the occurrence and severity of four possible sources of bias: selection, performance, detection, and attrition. Selection bias was assessed by two major criteria (selection of study population, representativeness) and two minor criteria (awareness of study hypothesis, possibility of change in the status of a risk factor as a result of lumbar radicular pain), and classified into no or minor, moderate, severe, or definite. The assessment of performance bias was based on a major criterion (validity and objectivity of exposure assessment) and two minor criteria (recall bias, blinding of assessors of exposure towards the outcome), and classified into no, minor, moderate, or definite. Detection bias was assessed by a major criterion (clear definition of outcome) and two minor criteria (standardised method of assessing outcome, blinding of assessors of outcome towards exposure). Attrition bias was assessed by two major criteria: completeness of follow-up and magnitude of missing data. Detection bias was classified into no or minor, moderate, or definite and attrition bias into no, possible, or definite. Studies with definite selection, performance or detection bias were excluded from the review.

Quantitative data analysis

No meta-analysis was feasible due to the heterogeneity of the studies. The results are reported qualitatively with an emphasis on study design and quality. The studies were also evaluated for sufficient sample size, control of confounders and use of appropriate analytical methods.

Results

The search strategy identified 2,975 study reports, of which 36 papers had lumbar radicular pain or clinically defined sciatica as outcome and at least one of the cardiovascular or lifestyle risk factors of interest as determinant(s). Of the relevant papers, studies with a response rate less than 60% [34], case-control studies with clinical controls [1, 23, 24, 35], and studies on disc bulge or degeneration [2, 3, 5, 30, 31, 40–42, 50] were excluded. Nineteen studies (22 papers) [6, 9, 11, 12, 14, 15, 19, 20, 25–29, 32, 33, 36–38, 45, 47, 49, 51] remained eligible for the review (Table 1).

Of these 19 studies, 4 were cross-sectional, 7 case-control and 8 were cohort studies. Twelve studies had no or minor bias, 3 studies had one source of moderate bias [25, 33, 49] and 4 studies [20, 45, 47, 51] had at least 1 source of severe bias or 2 of moderate bias.

Table 1 Studies on cardiovascular or lifestyle risk factors and lumbar radicular pain or clinically defined sciatica

Author	Study population	Age range (years)	Design	Sample size	Outcome	Exposures	Assessment of quality:biases			
							Selection	Performance	Detection	Attrition
Karvonen [20]	Conscripts	Mean age 9.7 ± 2.1	Cross-sectional	183	Current sciatic pain	Weight-related factors, exercise	Severe	Minor	Moderate	No
Riihimäki [36]	Concrete reinforcement workers or house painters	25–54	Cohort	328 prevalence 98 incidence	Sciatic pain, lifetime prevalence, 5-year incidence	Weight-related factors, smoking	No or minor	No	No or minor	No
Riihimäki [38]	Forest industry workers	Mean age 43.1 ± 9.5	Cohort	1,985	Sciatic pain during past 12 months	Physical activity	No or minor	No	No or minor	No
Miranda [34][a]	Forest industry workers	16.4–65.0 (mean 43.1)	Cohort	2,077 incidence 327 persistence	Incidence of sciatic pain more than 7 days during past 12 months, persistence of sciatic pain more than 30 days during past 12 months	Exercise, smoking	Moderate	No	No or minor	No
Riihimäki [37]	Machine operators, carpenters or office workers	25–49	Cohort	1,149	Sciatic pain during past 12 months	Smoking, Physical activity	No or minor	Minor (smoking), No (physical activity)	No or minor	No
Manninen [35]	Farmers	45–54	Cohort	366	Sciatic pain during past 12 months	Weight-related factors, smoking	No or minor	No	No or minor	No
Han [11], Lean [27]	General population	20–60	Cross-sectional	12,905	Sciatic pain during past 12 months	Weight-related factors	No or minor	No	No or minor	No
Leino-Arjas [28, 29]	Metal industry employees	18–64	Cohort	546	Radiating LBP during past 12 months	Smoking, weight-related factors, serum lipids, blood pressure, exercise	No	Minor (BMI), No (others)	No or minor	No
Le Gars [26]	Inpatients with lumbosciatic syndrome, healthy controls	23–64	Case-control	35 + 35	Clinically defined lumbosciatic syndrome	C-reactive protein	No or minor	Minor	No or minor	No
Gebhardt [9]	Inpatients with acute lumbosciatic pain, healthy controls	20–64	Case-control	31 + 1,572	Acute lumbosciatic pain due to prolapsed lumbar disc	C-reactive protein	No or minor	No	No or minor	No
Toda [47]	Outpatients with chronic low back pain and a positive straight leg raise test, healthy controls	45–69	Case-control	203 + 127	Clinically defined sciatic syndrome	Weight-related factors	Moderate	No	Moderate	No
Kostova [25]	Operators, repair staffs, shop managers, administrators, laboratory assistants, other	Not reported	Cross-sectional	898	Clinically defined lumbosacral radicular syndrome	Weight-related factors, smoking, serum lipids	Moderate	Minor (BMI, smoking), No (cholesterol)	No	No
Heliövaara [14]	General population	30–64	Cross-sectional	5,673	Clinically defined sciatica	Weight-related factors, smoking	No or minor	No	No or minor	No

Table 1 continued

Author	Study population	Age range (years)	Design	Sample size	Outcome	Exposures	Assessment of quality:biases			
							Selection	Performance	Detection	Attrition
Videman [51]	Former elite athletes (cases), eligible men for military service (controls)	<65	Case-control	937 + 620	Clinically defined sciatica	Weight-related factors, smoking	Moderate	Moderate	Moderate	No
Sugimori [45]	Inpatients with lumbar disc herniation, healthy volunteer controls	Cases 16–39 (mean 26.4), controls 21–28 (mean 21.4)	Case-control	48 + 53	Herniated lumbar disc	C-reactive protein	Severe	No	No or minor	No
Heliövaara [12, 13]	General population	20–59	Nested case-control	592 + 2,131 for smoking and physical activity, 332 + 1,205 for weight-related factors	Hospitalization due to herniated lumbar disc or sciatica	Smoking, physical activity, weight-related factors	No or minor	No	No or minor	No
Bostman [6]	Patients operated due to lumbar disc herniation, healthy controls	20–59	Case-control	1,128 + 6,095	Surgery due to herniated lumbar disc	Weight-related factors	No or minor	No	No or minor	No
Vessey [49]	Women attending family planning clinics	25–39	Cohort	17,032	Referral to hospital due to displaced lumbar disc	Weight-related factors, smoking	Moderate	No	No or minor	No
Kaila-Kangas [19]	Metal industry employees	18–64	Cohort	902	Hospitalization due to disc disorders	Weight-related factors, smoking	No or minor	Minor (BMI), No (smoking)	No or minor	No

[a] The baseline population was the same as in the study by Riihimäki [38]

Table 2 Associations between weight-related factors and lumbar radicular pain or clinically defined sciatica

Author	Study design	Outcome	Weight-related factor	Result	Adjustment for other covariates
Karvonen [20]	Cross-sectional	Sciatic pain	Obesity (percentage of body fat). Classification not reported	NS	None Sample was men only
Riihimäki [36]	Cohort	Sciatic pain	BMI categorised into 3 levels: < / = 23.9 kg/m^2, 24.0–27.9 or > / = 28.0 kg/m^2	NS	Age, occupation and back accidents Sample was men only
Manninen [35]	Cohort	Sciatic pain	Each unit increment in baseline BMI	NS	Gender-specific analyses controlled for age, height, mental stress, smoking, farm production and occupational class
Han [11], Lean [27]	Cross-sectional	Sciatic pain	Waist circumference, waist hip ratio and BMI were categorized into three tertiles.	BMI ↑ Waist hip ratio ↑ (men) Waist circumference ↑ (women) No dose-response relationship	Age, education and smoking
			Second paper: Waist circumference was grouped into 3 levels; <94, 94–101.9 and > / = 102 cm in men and <80, 80–87.8 and > / = 88 cm in women	Second paper: Waist circumference ↑ (men and women) No dose–response relationship	Age, education, employment, household, smoking, alcohol consumption and physical activity
Toda [47]	Case-control	Sciatic pain	Percentage of body fat, Mean BMI, Mean waist-hip ratio	Waist-hip ratio, BMI and body fat NS	Matched for age and gender
Leino-Arjas [28]	Cohort	Radiating LBP	Tertile distribution of body mass index	BMI ↑ A dose–response relationship in women	Age, gender and occupational class
Kostova [25]	Cross-sectional	Clinically defined lumbosacral radicular syndrome	BMI categorised into two levels: < / = 25 kg/m^2, > 25 kg/m^2	NS	Age and gender specific estimate
Heliövaara [15]	Cross-sectional	Clinically defined sciatica	Body mass index, an increase of 10 kg/m^2	NS	Age, gender, physical work load, occupational mental stress, traumatic back injury, smoking and alcohol consumption
Videman [51]	Case-control	Clinically defined sciatica	BMI categorised into two levels: < / = 30 kg/m^2, >30 kg/m^2(obesity)	Obesity ↑	Age

Table 2 continued

Author	Study design	Outcome	Weight-related factor	Result	Adjustment for other covariates
Heliövaara [13]	Nested case-control	Hospitalization due to herniated lumbar disc	BMI categorised into 6 levels: < / = 21.9 kg/m^2, 22.0–23.9, 24.0–25.9, 26.0–27.9, 28.0–29.9,> 30.0 kg/m^2	BMI ↑ (men) Thickness of triceps skin fold NS No dose–response relationship	Age, gender, place of residence, social class, occupation and smoking
Bostman [6]	Case-control	Surgery due to herniated lumbar disc	Mean BMI	BMI ↑	Age and gender specific analyses
Vessey [49]	Cohort	Referral to hospital for displaced lumbar disc	Weight grouped into five levels and BMI into six levels	Weight ↑ BMI NS	Age
Kaila-Kangas [19]	Cohort	Hospitalization due to disc disorders	BMI categorised into three levels: 15.0–24.9 kg/m^2, 25.0–27.5 or > 27.5 kg/m^2	Risk increased only for those with BMI > 27.5 kg/m^2 ↑	Age, gender, occupational class, physical work load, exercise, smoking, back disorders and stress syndrome

NS non-significant

Weight-related factors

Thirteen studies investigated associations between weight-related factors and lumbar radicular pain or clinically defined sciatica (Table 2). Of four cross-sectional studies, only one (two papers) [11, 27] showed an association between weight-related factors and sciatic pain. Three of four case-control studies [6, 12, 51] and three [19, 29, 49] of five follow-up studies found associations between weight-related factors and lumbar radicular pain or clinically defined sciatica. In one of these prospective studies [49] only weight was related to referral to hospital for displaced lumbar disc, and not body mass index. Three studies [11, 12, 27, 29] assessed a dose–response relation between weight-related factors and lumbar radicular pain or clinically defined sciatica. Only one of them showed a dose–response effect [29].

Smoking

Eleven studies assessed associations between smoking and lumbar radicular pain or clinically defined sciatica (Table 3). Most of these studies were carried out among occupational populations and the majority of these found no association between smoking and lumbar radicular pain or sciatica. A cross-sectional study found that only current smokers who smoked cigarettes for more than 20 years had a higher prevalence of lumbosacral radicular syndrome than non-smokers [25]. In a prospective study smoking was associated with sciatic pain only among machine operators, and not among carpenters or office workers [37]. In this study, however, smoking history was asked at the follow-up, and not at baseline. Two prospective studies showed that only current smokers with a long smoking history had an increased incidence of sciatic pain or hospitalization due to disc disorders compared to non-smokers [19, 33]. Two other follow-up studies reported a higher incidence of sciatic pain in ex- and current smokers than in never smokers [29, 32]. In a study by Manninen et al. [32] the association was statistically significant only in men. In addition, no relationship was found between the number of pack-years smoked and sciatic pain. In the other follow-up study [29], the odds ratios were adjusted only for age, gender and occupational class.

Physical exercise and sports

Six studies addressed the association between leisure time physical activity and lumbar radicular pain or clinically defined sciatica (Table 4). Physical activity was associated with a lower prevalence of sciatic pain in a cross-sectional study with a major bias [20]. A nested case-control study found no association between physical activity and hospi-

Table 3 Associations between smoking and lumbar radicular pain or clinically defined sciatica

Author	Study design	Outcome	Smoking	Result	Adjustment for other covariates
Riihimäki [36]	Cohort	Sciatic pain	Never, ex-, current smokers	NS	Age, occupation and back accidents Sample was men only
Riihimäki [37]	Cohort	Sciatic pain	Never, ex- current smokers	NS	Occupation, physical work load, exercise and other low back problems
Manninen [35]	Cohort	Sciatic pain	Never, ex-, current smokers Pack-years classified into 4 groups (0–7.2, 7.3–15.0, 15.1–30.0, >30.0 and tested as continuous variable	Ex-smoking ↑ (men) Current smoking ↑ (men) Pack-years NS	Gender-specific analyses controlled for age, height, body mass index, mental stress, farm production and occupational class
Miranda [34]	Cohort	Incidence of sciatic pain, persistence of sciatic pain	Never, ex-, current smokers (1–15 cigarettes/day, 1–15 year), current smokers (>15 cigarettes/day, 1–15 year), current smokers (1–15 cigarettes/day, >15 y), current smokers (> 15 cigarettes/day, >15 year)	Current smoking for more than 15 years ↑ incidence, ex-smoking ↑ persistent	Age, gender, mental stress, exercise and physical work load
Leino-Arjas [29]	Cohort	Radiating LBP	Never, ex-, current smokers	Ex-smoking↑ Current smoking ↑	Age, gender and occupational class
Kostova [25]	Cross sectional	Clinically defined lumbosacral radicular syndrome	Nonsmokers versus current smokers, Smoking < / = 20 years versus > 20 years, Smoking < / = 20 cigarettes/daily versus > 20 cigarettes/daily	Only smoking for more than 20 years ↑	None
Heliövaara [15]	Cross-sectional	Clinically defined sciatica	Never, ex-, current smokers (1–19 cigarettes per day), current smokers (>/ = 20 cigarettes per day)	NS	Age. gender, physical work load, occupational mental stress, traumatic back injury, smoking and alcohol consumption
Videman [51]	Case-control	Clinically defined sciatica	Not reported	NS	Age
Heliövaara [14]	Nested case-control	Hospitalization due to herniated lumbar disc or sciatica	Non-, -current smokers	NS	Age, gender, sociodemographic status, occupational groups, psychosocial distress, physical activity and medication use
Vessey [49]	Cohort	Referral to hospital for displaced lumbar disc	Non-smokers, smokers	NS	Age
Kaila-Kangas [19]	Cohort	Hospitalization due to disc disorders	Never, ex-, current smokers (< / = 9 pack-years), current smokers (> 9 pack-years)	Associated significantly only in current smokers (> 9 pack-years) ↑	Age, gender, occupational class, physical work load, exercise, overweight, back disorders and stress syndrome

NS non-significant

Table 4 Associations between physical exercise or sports activity and lumbar radicular pain or clinically defined sciatica

Author	Study design	Outcome	Physical activity	Result	Adjustment for other covariates
Karvonen [20]	Cross-sectional	Sciatic pain	Leisure-time physical activity classified into three levels: regularly, sometimes, not at all	Physical activity ↓	None, sample was men only
Riihimäki [38]	Cohort	Sciatic pain	Frequency of physical exercise (times/week) classified into three categories	Physical activity ↑ incidence A dose-response relationship	Age, gender, body mass index, physical work load factors, work-related psychosocial and organisational factors
Riihimäki [37]	Cohort	Sciatic pain	Physical exercise classified into two categories: max. once a week, or more than once a week	Physical activity ↑ incidence	Occupation, physical work load, smoking and other low back problems
Miranda [34]	Cohort	Incidence sciatic pain, persistence sciatic pain	Walking categorized into three levels and jogging into two levels	Moderate or active walking ↑ incidence (No dose-response relationship), Moderate or active jogging ↓ incidence, Moderate or active jogging ↑ persistent pain	Age, gender, mental stress, smoking and physical work load
Leino-Arjas [29]	Cohort	Radiating LBP	Tertile distribution of the number of hours spent on different activities by an intensity	Physical activity NS	Age, gender and occupational class
Heliövaara [14]	Nested case-control	Hospitalization due to herniated lumbar disc or sciatica	Physical exercise classified into two categories: inactive or active	Physical activity NS	Age, gender, sociodemographic status, occupational groups, psychosocial distress, physical activity and medication use

NS non-significant

Table 5 Associations between other cardiovascular risk factors and lumbar radicular pain or clinically defined sciatica

Author	Study design	Outcome	Other cardiovascular risk factor	Result	Adjustment for other covariates
Leino-Arjas [28, 29]	Cohort	Radiating LBP	Tertile distribution of total cholesterol, triglycerides, and diastolic and systolic blood pressure	Associated with third tertile of serum total cholesterol ↑ (men and women) within the first 10-year follow up and no association in 28-year follow up	Adjustment for age, gender, occupational class, work history, BMI, smoking and exercise in the 10-year follow up
				Associated with third tertile of serum triglycerides ↑ (men) in 10- and 28-year follow up	Adjustment for age, gender and occupational class in the 28-year follow up
				Associated with second and third tertile of systolic blood pressure ↑ (men), and with second tertile of diastolic blood pressure ↑ (men) in the 28-year follow up	
Le Gars [26]	Case-control	Clinically defined lumbosciatic syndrome	High-sensitive C-reactive protein (hs-CRP) level in the plasma	Mean hs-CRP significantly higher in patients than controls	Age and gender
Kostova [25]	Cross-sectional	Clinically defined lumbosacral radicular syndrome	Total cholesterol categorized into two groups < 6.2 mmol/l and > 6.2 mmol/l	Cholesterol NS	None
Gebhardt [9]	Case-control	Acute lumbosciatic pain due to prolapsed lumbar disc	High-sensitive C-reactive protein (hsCRP) level in the plasma	NS	None
Sugimori [45]	Case-control	Herniated lumbar disc	High-sensitive C-reactive protein (hs-CRP) level in the plasma	Mean hs-CRP significantly higher in patients than controls	None

NS non-significant

talization due to herniated lumbar disc or sciatica [14]. Of four prospective studies, one with no sources of major bias showed no association between physical activity and sciatic pain [29]. Physical activity increased the incidence of sciatic pain in two other prospective studies with no major bias [37, 38]. In the fourth cohort study with moderate selection bias, moderate or active walking increased while moderate or active jogging decreased the incidence of sciatic pain, although jogging increased the risk of persistent sciatic pain [33].

Other cardiovascular risk factors

Three case-control studies [9, 26, 45] addressed the association between high-sensitive C-reactive protein (hs-CRP) and clinically defined sciatica (Table 5). One study found no difference in serum hs-CRP level between patients with acute disc herniation-induced lumbosciatic pain and healthy controls [9]. In the other two studies [26, 45], serum hs-CRP level was higher in patients with lumbosciatic syndrome or herniated lumbar disc than in controls. In addition, patients with a higher preoperative hs-CRP level had poorer postoperative recovery [45]. In one of these studies [26], cases were matched to controls by age and gender, while in the other study [45], the difference in hs-CRP level between cases and controls was not controlled for potential confounding factors.

A cross-sectional study showed no association between serum cholesterol level and lumbosacral radicular syndrome [25]. A longitudinal study found associations between serum triglycerides or blood pressure and sciatic pain, but only in men [28, 29]. Serum cholesterol level was associated with sciatic pain in both men and women within the first 10-year follow-up [28], and not in the 28-year follow-up [29].

Discussion

The current review suggests that overweight or obesity is associated with clinically defined sciatica. Some studies showed an increased risk of self-reported radicular pain in people with a long-term history of cigarette smoking or in those with high levels of leisure-time physical activity. A few case-control studies found an association between serum C-reactive protein and clinically defined sciatica. No consistent associations were found for serum lipids levels or high blood pressure.

Overweight can increase the risk of sciatic pain by increasing the mechanical load on the intervertebral discs. However, no dose–response relation between weight-related factors and sciatica was found to support this hypothesis. Weight-related factors associated more consistently with clinically defined sciatica than with mere self-reported pain. Overweight may also cause sciatica via inflammatory processes. Obesity is accompanied with a low-grade systemic inflammation and most obese people have elevated levels of inflammatory markers, including C-reactive protein [4, 39, 48]. The increased secretion of inflammatory mediators from excess visceral adipose tissue may contribute to the development of symptomatic herniated lumbar disc disease among obese subjects.

Long-term smoking was associated with an increased risk of self-reported radicular pain in some occupational populations. An association between smoking and herniated lumbar disc has also been reported in case-control studies with clinical controls [1, 24]. The mechanism of such an association is not clear [7], but it could be related to cytotoxic effects of nicotine [18] or other substances in tobacco smoke. Smoking may also cause a chronic low-grade inflammation, with e.g. increased plasma C-reactive protein level as a marker [39].

Prospective studies in the current review suggested that high levels of leisure-time physical activity are associated with an increased risk of lumbar radicular pain. This finding is unexpected, since physical activity decreases the level of other risk factors addressed in this review [8, 10]. However, some types of physical exercise or sports may damage the lumbar structures.

There is increasing evidence that a chronic low-grade inflammation plays a pivotal role in the development of metabolic syndrome, cardiovascular disease and atherosclerosis [4]. Chronic inflammatory processes may also contribute to the development of lumbar radicular pain or sciatica [43, 46]. The severity of sciatic pain correlates positively with the concentration of plasma C-reactive protein [44]. Therefore, inflammatory processes may be potential mechanisms whereby cardiovascular or lifestyle risk factors lead to lumbar radicular pain.

The majority of studies on lumbar radicular pain or clinically defined sciatica were not designed to study the role of cardiovascular or lifestyle risk factors; they used these risk factors mainly as covariates. So far, there is little evidence suggesting causal associations. In addition, we do not know which stage of the pathological process these risk factors modify. Therefore, further prospective studies to investigate the role of cardiovascular or lifestyle risk factors in lumbar radicular pain or sciatica and to study their mechanisms of action are needed.

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