# Epidemiological Aspects of Low Back Pain

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## Abstract

Low back pain (LBP) is a major health problem, particularly in the contemporary societies of highly developed countries. This study seeks to define the influence of basic demographic and social factors, such as gender, body mass, physical activity, and the type of work, on the occurrence of lumbosacral spine pain in the early and middle-late adulthood. The study was based on a self-reported survey, using the revised Oswestry Low Back Pain Disability Questionnaire to evaluate pain symptoms, and managing everyday tasks. Physical activity was evaluated on the Minnesota Leisure Time Physical Activity Questionnaire. We found that patients in the early adulthood had a significantly lower level of disability. The older patients had a greater low back pain and motion, sleeping, and social life problems. Neither did gender nor the type of work, leisure time physical activity, or body mass appreciably affect the level of disability due to low back pain in both younger and older patient groups. We conclude that, all else unchanged from the epidemiological standpoint, wear and tear of the spine structure naturally progressing with age seems a major determinant of the appearance of low back pain.

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## 1  Introduction

Low back pain is one of the biggest problems of modern medicine, leading to worrisome symptoms, work absenteeism, engagement of medical resources and services, and chronic disability in extreme cases. The etiology of low back pain is not full well clear. Further, there is a steady upward trend in its incidence (Allegri et al. 2016). A major issue is the lack of a precise knowledge about the risk factors for the occurrence of low back pain (Green et al. 2018). Many studies point to obesity as a risk factor, but most researchers

underscore that this relationship is rather poorly documented (Heuch et al. 2013; Leboeuf-Yde 2000). Some other studies draw attention to more frequent back pain in patients with mental disorders (Chou et al. 2016; Cabak et al. 2015). Another risk factor might be the type of work performed, depending on whether it is white-collar or blue-collar work. Sedative lifestyle predisposes to spinal problems, particularly in office workers (Cabak et al. 2017; Curyło et al. 2017).

Gender may also potentially factor in the development of low back pain. Wáng (2015) has drawn attention to the period of menopause, which is associated with the acceleration of intervertebral disc dysfunction or injury, which increases the likelihood of developing spine pain syndromes. Women also are slower than men to recuperate from low back pain (Peul et al. 2008). The present study seeks to define the influence of basic demographic and social factors, such as gender, body mass index (BMI), physical activity, and the type of work on the occurrence of low back pain in the middle-aged adults.

## 2 Methods

The study was conducted from January to March 2017 in 80 patients (40 men and 40 women) in a rehabilitation outpatient clinic in Warsaw, Poland. Patients were evenly subdivided into two age groups: early (F/M – 15/19; mean age of 31.8 $\pm$ 5.2 years) and middle-late adulthood (F/M – 25/21; mean age of 59.2 $\pm$ 10.1 years). The revised Oswestry Low Back Pain Disability Scale (Fairbank and Pynsent 2000) was used to assess the intensity of pain symptoms. The scale consisted of ten items concerning the severity and changeability of pain; the endurance in sitting, standing, and walking; and the agility in lifting items, socializing, and traveling and also concerning personal self-care and sleep problems. Each item was evaluated on the 5-point Likert scale, where zero indicated no problems whatsoever and five indicated the most severe limitation of an activity as reported by the subject. Physical activity was evaluated on the Minnesota Leisure Time Physical Activity Questionnaire (MLTPAQ).

The MLTPAQ assesses, in a subjective manner, physical activity of an individual when he is not engaged in daily work-associated activities (Richardson et al. 1994). The questionnaire consists of eight categories of physical activity, each having a different burden on the musculoskeletal system and thus a different energy expenditure. The quantification of results is in metabolic equivalents of task (MET), where 1 MET equals energy expenditure in terms of oxygen consumption per 1 kg of body mass while sitting at rest.

Data were expressed as means $\pm$SD. Data distribution was checked with the Shapiro-Wilk test. Quantitative data were compared between the two age groups with a $t$-test or the Mann-Whitney test for normal and skewed distribution, respectively. Pearson's chi-squared test ($\chi^2$) was applied to sets of categorical data to evaluate the probability of differences between them appearing by chance. Spearman's rank-order correlation was used to evaluate the correlation between the severity of low back pain and age, BMI, and physical activity. A $p$-value < 0.05 defined the statistically significant differences. A commercial Statistica v13 package was used for all analyses (StatSoft, Tulsa OK).

## 3 Results and Discussion

We found that the scores of low back pain intensity in early and middle-late adulthood periods, according to the Oswestry questionnaire, amounted to 0.89 and 2.78 points, respectively; the difference between the two groups was significant ($p < 0.001$). Likewise, pain instability and alterations in its intensity were significantly greater in middle-late adulthood ($p < 0.001$). All questionnaire's items related to musculoskeletal and motion agility scored more, i.e., demonstrated worse performance, in middle-late adulthood as well (Table 1). Interestingly, despite greater pain perception, older patients were more engaged in social life and traveling and more oriented toward personal care and hygiene.

On average, taking all the patients irrespective of gender, the proportion of the physically disabled was about 2.7-fold higher in the group

**Table 1** Scoring of complaints in patients with lumbosacral spine pain, stratified into the early and middle-late adulthood age, according to the revised Oswestry Low Back Pain Disability Scale

|  | Early adulthood ($n = 34$) | Middle adulthood ($n = 46$) | $p$ |
|---|---|---|---|
| Age (year) | $31.8 \pm 5.2$ | $59.2 \pm 10.1$ | <0.001 |
| Pain | $0.89 \pm 0.76$ | $2.78 \pm 1.18$ | <0.001 |
| Pain changeability | $1.14 \pm 1.12$ | $2.56 \pm 1.27$ | <0.001 |
| Personal care | $0.77 \pm 0.88$ | $1.82 \pm 1.47$ | <0.003 |
| Lifting items | $0.94 \pm 0.80$ | $2.73 \pm 1.16$ | <0.001 |
| Walking | $0.66 \pm 0.84$ | $2.00 \pm 1.31$ | <0.001 |
| Sitting | $0.94 \pm 0.87$ | $2.33 \pm 1.09$ | <0.001 |
| Standing | $0.86 \pm 0.81$ | $2.69 \pm 1.40$ | <0.001 |
| Sleep problems | $0.57 \pm 0.61$ | $2.00 \pm 1.33$ | <0.001 |
| Social life | $0.91 \pm 0.82$ | $1.78 \pm 1.55$ | <0.030 |
| Traveling | $0.91 \pm 0.82$ | $2.11 \pm 1.13$ | <0.001 |

Data are means ±SD

**Table 2** Proportions of all patients with disability due to lumbosacral spine pain, stratified by age

| Age group | $\bar{x} \pm SD$ | Min | $Q_1$ | Me | $Q_3$ | Max | $p$ |
|---|---|---|---|---|---|---|---|
| Early adulthood ($n = 34$) | $17 \pm 9\%$ | 0% | 12% | 18% | 24% | 36% | <0.001 |
| Middle-late adulthood ($n = 46$) | $46 \pm 17\%$ | 20% | 30% | 44% | 60% | 80% |  |

Data are $\bar{x} \pm SD$, mean ± standard deviation
*Min*, minimum, *Q1* quartile 1, *Me* median, *Q3* quartile 3, *Max* maximum

**Table 3** Proportions of patients with disability due to lumbosacral spine pain, stratified by age and gender

|  | $\bar{x} \pm SD$ | Min | $Q_1$ | Me | $Q_3$ | Max | $p$ |
|---|---|---|---|---|---|---|---|
| Early adulthood ($n = 34$) |  |  |  |  |  |  |  |
| Women ($n = 15$) | $12 \pm 11\%$ | 0% | 5% | 4% | 21% | 30% | 0.231 |
| Men ($n = 19$) | $15 \pm 8\%$ | 0% | 10% | 14% | 19% | 35% |  |
| Middle-late adulthood ($n = 46$) |  |  |  |  |  |  |  |
| Women ($n = 25$) | $41 \pm 22\%$ | 10% | 20% | 30% | 46% | 70% | 0.223 |
| Men ($n = 21$) | $48 \pm 18\%$ | 20% | 25% | 49% | 65% | 80% |  |

Data are $\bar{x} \pm SD$, mean ± standard deviation
*Min* minimum, *Q1* quartile 1, *Me* median, *Q3* quartile 3, *Max* maximum

of older patients than that in early adulthood ($p < 0.001$) (Table 2). The older age-dependent predominance of disabilities was further accentuated when the patients were stratified by gender; $48 \pm 18\%$ older vs. $15 \pm 8\%$ younger men and $41 \pm 22\%$ older vs. $12 \pm 11\%$ younger women. However, there were no gender-specific differences in either age group of patients (Table 3). That result may somehow seem at variance with other epidemiological studies that point to a higher prevalence of low back pain in women, compared with men (Bento et al. 2019; Jiménez-Trujillo et al. 2019; Wáng et al. 2016). Some previous studies also draw attention to the association between female gender and low back pain. Damage to the intervertebral discs, often reported during menopause, has been pointed out as a factor that predisposes to lumbosacral spine pain complaints (Wáng 2015). However, a direct comparison across various studies is hardly meaningful due to different populations studied and different tools of assessment employed in each. Attention is also paid to muscular weakness and obesity as factors underscoring the occurrence of spinal pain in postmenopausal women, although this may be a coexisting phenomenon rather than a risk factor for pain syndromes (Toda et al. 2000).

**Table 4** Proportions of patients with disability due to lumbosacral spine pain, stratified by age and the type of work

|  | $\bar{x} \pm$SD | Min | $Q_1$ | Me | $Q_3$ | Max | $p$ |
|---|---|---|---|---|---|---|---|
| Early adulthood ($n = 34$) | | | | | | | |
| Blue-collar | 37 ± 19% | 9% | 20% | 30% | 50% | 72% | 0.302 |
| White-collar | 30 ± 20% | 0% | 14% | 27% | 38% | 60% | |
| Mixed work | 33 ± 22% | 0% | 17% | 23% | 48% | 76% | |
| Middle-late adulthood ($n = 46$) | | | | | | | |
| Blue collar | 34 ± 20% | 7% | 20% | 31% | 56% | 75% | 0.320 |
| White collar | 30 ± 18% | 0% | 15% | 26% | 36% | 61% | |
| Mixed work | 36 ± 23% | 0% | 17% | 25% | 58% | 80% | |

Data are $\bar{x} \pm$SD, mean ± standard deviation
*Min*, minimum, *Q1* quartile 1, *Me* median, *Q3* quartile 3, *Max* maximum

The nature of the patients' work, be it blue-collar or white-collar work, failed to exert any appreciable effect on the presence of disability linked to the low back ailment and pain, irrespective of patients' age. The proportion of disabilities in all types of occupation ranged between 30% and 40% (Table 4).

The mean leisure time physical activity, assessed with the MLTPAQ questionnaire, amounted to $5.0 \pm 1.4$ MET in the early adulthood group and to $4.8 \pm 1.7$ MET in the middle-late adulthood group of patients; the difference between the two groups was insignificant ($p > 0.05$). Likewise, BMI failed to differ significantly between the two groups of patients, despite a tendency for a somewhat higher BMI in the middle-late adulthood group; $23.5 \pm 2.7$ vs. $25.5 \pm 3.2$ kg/m$^2$, respectively.

In contradistinction to the nature of the patients' work, the level of their leisure time physical activity and of BMI associated significantly with the appearance of disability due to the low back pain predicament. The associations were adverse in case of leisure time activity in both early adulthood and middle-late adulthood age groups ($r = -0.536$ and $r = -0.659$, respectively; $p < 0.001$) and positive in case of BMI ($r = 0.686$ and $r = 0.587$, respectively; $p < 0.001$) (Table 5). These findings are, generally, in line with other literature reports. Physical activity has been reported to decrease the risk of self-reported low back pain, particularly in the middle-late-aged persons (Park et al. 2018). Moreover, physical activity is considered to ameliorate the burden

**Table 5** Associations between physical activity, assessed with the Minnesota Leisure Time Physical Activity Questionnaire (MLTPAQ), and body mass index (BMI) with the appearance of disability in patients with lumbosacral spine pain, stratified by age groups

|  | $n$ | $r$ | $p$ |
|---|---|---|---|
| Early adulthood ($n = 34$) | | | |
| Leisure time physical activity | 34 | 0.536 | **<0.001** |
| BMI | 34 | 0.686 | **<0.001** |
| Middle-late adulthood ($n = 46$) | | | |
| Leisure time physical activity | 46 | 0.659 | **<0.001** |
| BMI | 46 | 0.587 | **<0.001** |

Spearman's rank-order correlation tests

of persisting low back pain (Amorim et al. 2019). Many authors point to obesity as a risk factor for low back pain, although some others put in doubt that there is strong evidence for a causal relationship between obesity and back pain (Dario et al. 2015; Leboeuf-Yde et al. 1999). The present findings seem to lend support for the former notion, as we found that BMI associates with the appearance of low back pain complaints. Further, this association comes to light already in the upper part of the BMI norm. We found, however, that the associations of both leisure time physical activity and BMI with the appearance of disabling low back pain were independent of gender and age of the patients investigated.

The findings of this study confirm that patients in the middle-late adulthood suffer more frequently from low back pain than do patients in the early adulthood period of life. The ailment is manifest in a greatly enhanced expression of symptoms, particularly in the musculoskeletal,

motion-related realm in the older compared to earlier-aged patients, leading, on average, to about threefold greater appearance of disability in patients in the middle-late adulthood. Despite the obvious symptoms of dysfunction of daily life activities, the older patients showed well-preserved or even enhanced social sphere of functioning. That might have to do with a desire to overcome the physical encumbrance by older adults, which also was reflected in their having a comparable metabolic equivalent of task to that of younger adults.

We further found that the level of disability due to low back pain, assessed by the Oswestry Low Back Pain Disability scale, was basically uninfluenced by other possibly intervening factors investigated, such as gender, type of work, BMI, or leisure time physical activity. We conclude, therefore, that the present findings strongly suggest that older age per se was a major detriment leading to enhanced propensity for the appearance of low back pain. It seems that structural spine damage that naturally and inevitably occurs as a result of normal wear with age is an essential underlier of low back pain complaints, all else unchanged. Low back pain continues to be a scourge that is in the top ten most common health issues in the developing world (Lee et al. 2019; Green et al. 2018). Considering the biopsychosocial burden and the costs of medical services engaged in the management of spinal pain syndromes, further epidemiological insights into the underlying mechanisms and risk factors are desirable in order to undertake effective preventive and curative measures.

**Conflicts of Interest** The authors declare no conflicts of interest in relation to this article.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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