

# Low back pain among Kosovo power plant workers: a survey

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## ABSTRACT

**BACKGROUND:** low back pain (LBP) has been identified as one of the most costly occupational illnesses among the worldwide working population.

This study was designed to assess the prevalence of LBP among Kosovo power plant workers and to examine the correlation between age and job tenure with LBP.

**METHODS:** a cross sectional questionnaire survey was carried out on 391 workers of the Kosovo Energy Corporation. Two hundred and six production workers (Group I) and 185 office workers (Group II) were included in the study. All the subjects were asked about LBP they had experienced in the previous year. Subjects with LBP then answered the questionnaire regarding the severity of LBP and functional disability caused by LBP. The severity of LBP was evaluated with a 10 mm visual analog scale (VAS). The Oswestry low back pain disability questionnaire (OSW) was used to measure functional disability.

**RESULTS:** the prevalence of LBP was higher in Group I than in Group II (83.4%, 61.6%, respectively,  $p < 0.001$ ). The mean VAS and OSW score was higher in Group I than in Group II ( $p < 0.001$  vs.  $0.016$ ). There was a significant correlation of age ( $r = 0.249$ ,  $p < 0.01$  and  $r = 0.155$ ,  $p < 0.05$ ), and job tenure ( $r = 0.245$ ,  $p < 0.01$  and  $r = 0.190$ ,  $p < 0.05$ ) with VAS and OSW scores in blue collar workers with LBP. However, there was a statistically significant negative correlation found between job tenure and VAS and OSW scores of the office workers with LBP ( $p < 0.05$ ).

**CONCLUSIONS:** low back pain occurred at a high rate within this company. This study identified that age and job tenure correlated with the severity and functional disability of LBP among blue collar workers.

*Key words:* Low back pain; Power plant workers; Oswestry low back pain disability questionnaire

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## INTRODUCTION

Low back pain (LBP) is a common health condition in working populations throughout the world and a major cause of disability among the workforce (1, 2). LBP remains the predominant occupational health problem in

most industrialized countries, accounting for about 20% to 30% of all workers' compensation claims and up to 50% of all direct compensation costs (3-5).

Some previous studies have shown that ergonomic risk factors, including physical exertion at work, frequent bending and

twisting, heavy lifting and patient-handling tasks, all play important roles in contributing to the occurrence of LBP (1, 6, 7).

Most research has attempted to determine which causal factors might predict and, hence, prevent work-related LBP. Common factors thought to contribute to the onset of LBP have included sex, age, work postures and type of work. Those workers who are engaged in more intense physical labor have a higher frequency and severity of LBP (8, 9).

Personal health factors, such as smoking, being overweight and lack of physical exercise are often listed among the most important risk factors for LBP, but the scientific evidence to support this is surprisingly vague and inconsistent (10).

Age, length of employment, and knowledge of lifting principles were predominant characteristics for determining risk factors associated with LBP (11, 12). The demographic factor that has most commonly been found to be associated with chronic disability is older age (13, 14). Job experience affects the magnitude and variability of spinal load during repeated lifting exertions (15).

The aim of this study was: 1) to assess the prevalence of LBP among Kosovo power plant workers, and 2) to examine whether age and job tenure are correlated with LBP. We hypothesized that the prevalence of LBP in power plant workers would be high, and that age and job tenure might not correlate with LBP.

## METHODS

### Subjects and procedures

This study used a cross-sectional design. Two hundred and six production workers (Group I) and 185 office workers (Group II) were selected and invited to take part in the present cross-sectional study. The principal job tasks of blue collar workers were: working with their trunk in awkward postures, necessity to change posture regularly, driving vehicles or machines, lifting weights, pushing and pulling of loads. The job tasks of office workers often involved long periods of seated work.

We included all workers aged 18-65 years, willing and able to give informed consent. The study exclusion criteria included caudal equine syndrome, previous spinal fracture, inflammatory or tumor back conditions,

osteoporosis of the spine, and a history of psychiatric illness. A self-administered questionnaire, together with an information leaflet about the study was given to workers at their workplace. A research assistant checked the returned questionnaire onsite to assure completeness of compilation.

### Questionnaire

The questionnaire included individual characteristics: age, smoking habits (yes/no), information about profession (blue collar workers: welders, maintenance technicians, electricians, thermal technicians, mechanical field technicians, drivers/crane operators, mining technicians, transmission technicians, firefighters and white collar workers: accountants, secretaries, telephone operators, computers experts, managers, and constructions engineers), and duration of employment (years). The main point of interest in the questionnaire was the workers' experience of LBP in the 12 months prior to administration of the questionnaire. The following question was used to determine this and was worded as follows: During the past year, have you experienced low back problems (back pain, discomfort)? If the answer was NO, no further questions were needed. However, if the subject answered with YES, then he/she had to proceed to other questions about the severity and functional disability of his/her LBP.

The severity of LBP was evaluated based on a 0-10 range visual analogue scale (VAS) (16). The severity of pain was measured on 0 to 10 numerical scales with 0 representing no pain and 10 representing worst possible pain.

The Oswestry low back pain disability questionnaire (OWS) (17) was used to measure functional disability. The questionnaire consists of 10 sections related to the effect that pain has on typical daily activities, including personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and homemaking. The workers were instructed to tick the statement in each section that most accurately described their functional disability. The scores of each section ranged between 0 and 5, and the score is subsequently transformed into 0-100. Higher scores indicated greater disability, with scores above 60% indicating highly severe disability, whereas scores ranging from 0-20% indicated a minimal disability.

According to the 9<sup>th</sup> revision of the international classification of diseases (ICD-9) (18) LBP is defined as a pain, without specific underlying cause, localized between the lower angle of the scapulae and above the buttocks.

The study was approved by the Regional Ethical Board at the Institute of Occupational Medicine and by the Research Ethics Committee, University of Prishtina, Kosovo. Written informed consent was obtained from each participant, along with the approval of the Kosovo Energy Corporation administration.

### Statistical analysis

The statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 13.0. The Student t test was used to determine the differences between parametric variables (age, job tenure) of the subjects and their relation to LBP in Group I and II. The correlations of age/job tenure with VAS and OSW scores of the workers with LBP in Group I and II was assessed by Pearson correlation analysis. A Chi-square test was used to analyze categorical data. A p-value of <0.05 was regarded as statistically significant.

## RESULTS

Table 1 shows the basic characteristics of the study's subjects. Average age, job tenure, and smoking habits of the workers with and without LBP were almost similar; there

were no statistically significant differences ( $p>0.05$ ). One hundred and seventy-three blue collar workers (83.4%) in group I and 114 white collar workers (61.6%) in group II reported to have suffered from LBP ( $p=0.001$ ). The prevalence rates of LBP in the two groups significantly differed ( $p=0.001$ ). LBP was more prevalent among blue collar workers (83.4%).

The mean age, job tenure, smoking, VAS, and OSW score of the subjects with LBP in Group I and II are shown in Table 2. Similarly, no statistically significant differences were found in average age, job tenure, and smoking habits between blue collar and white collar workers with LBP ( $p>0.05$ ). However, the mean VAS and OSW scores of the subjects with LBP was higher in Group I than in Group II ( $p<0.001$  and  $p<0.016$ , respectively).

For further study, the correlations of age/job tenure and LBP were examined. Job tenure was positively correlated with VAS and OSW scores ( $r=0.245$ ,  $p<0.01$  and  $r=0.190$ ,  $p<0.05$ ) in blue collar workers with LBP. A Statistically significant negative correlation was found between job tenure and VAS and OSW scores ( $r=-0.234$ ,  $p<0.05$  and  $r=-0.236$ ,  $p<0.05$ ) in white collar workers with LBP. There was no significant correlation determined between age and VAS and OSW scores in white collar workers with LBP ( $r=-0.09$  and  $r=-0.08$ ,  $p>0.05$ ). A statistically significant correlation was found between age and VAS and OSW scores in blue collar workers with LBP ( $r=0.249$ ,  $p<0.01$  and  $r=0.155$ ,  $p<0.05$ ) (Correlation coefficients and p values are shown in Table 3).

TABLE 1

BASELINE DEMOGRAPHICS FOR BOTH GROUPS			
	GROUP I (N=206)	GROUP II (N=185)	P-VALUE
AGE (YEARS)	47.98 ± 8.97	49.44 ± 8.03	0.236
JOB TENURE (YEARS)	21.63 ± 9.68	21.05 ± 8.32	0.657
SMOKING			
YES	122 (59.1%)	116 (62.7%)	0.694
NO	84 (40.9%)	69 (37.3%)	
LOW BACK PAIN (N)	173 (83.4%)	114 (61.6%)	<b>&lt;0.001*</b>

Group I: blue collar workers; Group II: white collar workers

\*statistically significant

TABLE 2

MEAN AGE, JOB TENURE, VAS AND OSW OF SUBJECTS WITH LOW BACK PAIN IN GROUP I AND II			
	GROUP I (N=173)	GROUP II (N=114)	P-VALUE
AGE (YEARS)	47.95 ± 9.06	49.71 ± 8.01	0.199
JOB TENURE (YEARS)	21.56 ± 9.80	21.06 ± 8.25	0.731
SMOKING			
YES	112 (64.7%)	67 (58.9%)	0.718
NO	61 (35.2%)	47 (41.1%)	
VAS (0-10)	8 (2-10)	4 (2-8)	<b>&lt;0.001*</b>
OSW (%)	30 (6-74)	26 (10-54)	<b>0.016*</b>

OSW, Oswestry low back pain disability questionnaire; VAS, visual analogue scale;

\*statistically significant

TABLE 3

CORRELATIONS OF AGE AND JOB TENURE WITH VAS AND OSW SCORES IN PRODUCTION WORKERS AND OFFICE WORKERS WITH LOW BACK PAIN				
	BLUE COLLAR WORKERS (N=173)		WHITE COLLAR WORKERS (N=114)	
	VAS R	OSW R	VAS R	OSW R
AGE	0.249**	0.155*	-0.09	-0.08
JOB TENURE	0.245**	0.190*	-0.234*	-0.236*

r = correlation coefficient according to Pearson correlation

OSW, Oswestry low back pain disability questionnaire; VAS, visual analogue scale;

p < 0.05\* p < 0.01\*\*, statistically significant

## DISCUSSION

This cross-sectional investigation attempted to examine the prevalence of LBP among power plant workers. The hypothesis that was considered in this study was that the prevalence of LBP in power plant workers would be high since these workers comprise a unique occupational group characterized by job tasks that include heavy physical labor with high levels of force being exerted.

The LBP prevalence among power plant blue- and white-collar workers was 83.4% vs. 61.6%, respectively. The findings of this study agree with previous studies that report the

prevalence of LBP in working populations being between 60-85% (2, 5, 10, 19-22).

This high prevalence was noted regardless of age and job tenure. LBP typically begins at a relatively young age, with the highest frequency of symptoms occurring between 35 and 55 years of age (4). Back pain, once it occurs, is often more likely to persist with only a minimum chance of full recovery, and hence its increasing prevalence with age is not surprising (20).

In the study by Nieuwenhuyse et al., LBP was associated with increasing age, though the age group just below 45 years was found to be most affected by LBP (1). In our study, the

mean age of the workers was 47.9 vs. 49.7 years, which places them in this risk group. This is in concordance with one study where the average age of the patients was 47.8 years (23).

In this study, smoking was more prevalent among blue collar workers (64.7%) with LBP. Our results are consistent with the findings of several cross-sectional and longitudinal population based studies, which have shown that current and former smokers have more low back pain, as well as pain in other areas, than never smokers (10, 21). Cigarette smoking, and nicotine in particular, facilitates the degeneration of the intervertebral discs by disturbing disc metabolism and proteoglycan and collagen synthesis, even at the gene expression level (10, 24, 25).

When considering age, the severity of LBP was stronger in older employees than in younger ones. It is thought that a human's general ability declines past 20 years of age and that these people, owing to their haste and hurry to perform tough jobs, or their willingness to carry inappropriate loads, are also more likely to have severe LBP. Flexion, twisting and lifting activities generate fatal loads on the spine that is low in bone mineral density (4).

In our sample, LBP was more severe among blue collar workers (mean VAS score and OSW scores were higher in blue collar workers than in white collar workers). There was a significant correlation between age, the permanence of years within this occupation, and severity of LBP. These findings may be associated with inappropriate postures and heavy weight lifting on the production line. As expected, the self-reported physical workload and perceived exertion differed markedly between white and blue collar workers. It has been reported that back pain and the degeneration of the lumbar spine are associated with duration of employment (19). Bilski et al. investigated the relationship between LBP and the duration of an employment and found that the complaints for back pain occurred in as short as a 5-year employment term (26). Results here indicate that age and job tenure were significantly associated with severity of LBP. This is in agreement with the findings of other researchers (1, 2, 27).

In our study, a statistically significant negative correlation was found between the years spent in this occupation and VAS and OSW scores ( $r=-0.234$ ,  $p<0.05$  and  $r=-0.236$ ,

$p<0.05$ ) in white collar workers with LBP. These results could be due to several possible factors. For example, white collar workers who developed LBP may have changed professions due to the pain, and those who have remained in the profession may be the ones who have had LBP for some time, but have recovered and have learned to prevent new episodes. Furthermore, perhaps white collar workers have more opportunities to choose their type of work by using more appropriate routes; they may accept their problems more easily and report fewer pain complaints. They might be better at seeking medical assistance in time and before the problem aggravates. We were not able to find any study in the literature addressing this issue.

Because Kosovo is a country with an abundance of workers, especially in the public sector, the financial cost of low back pain could be tremendous and might affect the Kosovo economy seriously.

Kosovo is a post conflict country faced with the lack of positive laws and normative acts capable of creating sustainable structures which survey and manage General Health Policies, Public Health Programs and particularly Work Related Disability occurrence. It would certainly be beneficial if Kosovo followed the example of Croatia. Croatia signed a memorandum of understanding with the European Commission in order to participate in the EU Public Health Programme (28). Simultaneously, valuable information can be gathered through the South East Europe Health Network project on the Public Health Services, developed and implemented within the framework of the Stability Pact Initiative for Social Cohesion (29). Consequently, the Kosovo Institute of Public Health may be able to compare and exchange the complete set of obtained data regarding work related disability with other SEE countries.

In addition, a Disability Information System needs to be established in order to promote statistical studies on disability. The information system activity not only valorizes the existing flow of information, but also seeks to implement new flows and to look at aspects, such as quality of life of people with disabilities, in greater detail (30). In Italy, for example, many initiatives are currently being undertaken to identify the protocols that evaluate disability, based on the ICF framework, in selected contexts such as

school and work integrations (31).

To sum up, since the design in this study is cross-sectional, the results should be interpreted with great caution because they express only the associations and not the causal link between the risk factors and prevalence of LBP. The limitation of this study is that work related physical factors were not addressed and thus their potential influence on the occurrence of LBP could not be established. Finally, in future studies, data gathered from work related physical factors could also be examined and this might provide additional information about the factors that contribute to LBP among Kosovo power plant workers.

Moreover, corrective measures and ergonomics intervention programs must be recommend as these help to reduce the level of exposure to avoidable risk factors, consequently preventing the occurrence of LBP. Meanwhile, our results support the possible value of health promotion and stress management as a part of LBP prevention

programs at work, in addition to the more traditional occupational health and safety measures. Aging workers may benefit particularly from such an integrated approach.

## CONCLUSIONS

Low back pain occurred at a high rate within this company. This study identified that age and job tenure correlated with the severity of LBP and functional disability resulting from it, particularly among blue collar workers with LBP. Further extensive studies involving ergonomic measurements are needed to validate our results for Kosovo power plant workers.

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