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ORIGINAL REPORT

LOW BACK PAIN AMONG CAREGIVERS OF SPINAL CORD INJURED PATIENTS

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Objective: **To evaluate the prevalence of low back pain among caregivers of patients with spinal cord injury and to investigate the risk factors for LBP among this population.**
Design: **A cross-sectional study.**
Subjects: **A total of 100 spinal cord injured patients and their caregivers, and 87 healthy control subjects.**
Methods: **Caregivers and control subjects completed a questionnaire about demographic characteristics and low back pain. Pain was evaluated using a visual analogue scale and the Oswestry Disability Index. Duration, severity and level of spinal cord injury, and functional level were recorded.**
Results: **The prevalence of low back pain was higher among caregivers than among the control group. Visual analogue scale scores of caregivers with low back pain were higher than those of the control group, whereas there was no significant difference in the Oswestry Disability Index score. There was a significant correlation between low back pain and level, severity and duration of injury. Prevalence of low back pain was higher among caregivers of patients with low functional scores.**
Conclusion: **Low back pain is common among caregivers of patients with spinal cord injury and is associated with duration of injury, level of injury, severity of injury, and functional level of the patient.**

Key words: caregivers; spinal cord injury; low back pain.

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INTRODUCTION

Low back pain (LBP) is a common cause of disability and functional loss in developed countries. While the life-long prevalence of LBP is approximately 70%, the annual incidence ranges from 25% to 45% (1, 2). Age, gender, lifting heavy objects, and certain jobs are the main risk factors (1–4).

Risk factors associated with LBP in the workplace have also been studied, particularly in occupations such as nursing, industrial work, police service, and fire service (3, 4). Lifting heavy objects, inappropriate lifting techniques and poor fitness levels are risk factors among nurses, whereas heavy physical activity, frequent bending and lifting, repetitive movements, being exposed to vibration, and depression are significant risk factors among industrial workers (3–11).

As physicians working in the largest clinic in Turkey that deals with the intensive rehabilitation of spinal cord injured patients, we frequently encounter problems due to LBP among professional caregivers of patients with spinal cord injury (SCI). The life expectancy of patients with SCI has increased in recent decades due to advances in medicine and rehabilitation techniques (12, 13). Together with the increasing prevalence of road traffic accidents this means that there are increasing numbers of younger patients with SCI. Improvements in post-accident survival rates and life expectancy mean that these patients are supported by a caregiver for longer, thus the health of caregivers is of great importance, particularly decreasing and controlling the frequency of LBP, and LBP has become a social burden.

To the best of our knowledge, there are no published data concerning the frequency and risk factors of LBP among caregivers of patients with SCI, or recommendations about preventive measures. The aim of the present study was to evaluate the prevalence of LBP in caregivers of patients with SCI and to determine the risk factors for LBP.

METHODS

Participants

The caregivers of 185 patients with SCI who were rehabilitated in our clinic between May 2008 and January 2010 were recruited to the study. Exclusion criteria were: under 18 years of age; previous episodes of LBP; working for less than 3 months; and family members of patients. Five caregivers were excluded due to previous episodes of LBP, and 80 because they were family members (spouses, parents, children, other relatives, etc.), in order to avoid psychological factors affecting LBP. The remaining 100 caregivers were "professional caregivers", who were employed by the families and who had been nursing the patients since they were injured. There are no staff caregivers at our rehabilitation centre, thus families mainly support the patients themselves. However, in some circumstances they employ professional nursing support and, in Turkey, these caregivers are allowed to work at the hospitals. Thus, 100 caregivers fulfilling the inclusion criteria, and an age- and body mass index (BMI)-matched control group, comprising 87 healthy subjects, were included in the study.

The caregivers were informed about the study and invited to participate. Signed informed consent was obtained from all participants. The study was officially approved by the local ethics committee.

Study measures

Participants (caregivers and controls) completed a questionnaire. The first part of the questionnaire consisted of demographic characteristics.

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Table I. *Demographic characteristics of the study group (caregivers) and control group*

	Study group ($n=100$)	Control group ($n=87$)	p-value
Age, years, mean (SD)	37.8 (13.5)	38.4 (12.7)	0.670
BMI, kg/m^2, mean (SD)	22.6 (2.5)	22.7 (2.4)	0.875
Gender, *n* (%)			
Female	71 (71)	61 (70)	
Male	29 (29)	26 (29)	
Pain, *n* (%)			
Present	58 (58)	24 (27.6)	
Absent	42 (42)	63 (72.4)	<0.001

BMI: body mass index; SD: standard deviation.

Data regarding age, gender, educational status, and BMI of participants in the study and the control group were recorded at the beginning of the study. Caregivers were asked whether they had LBP. The extent of pain in those with LBP was evaluated by using the modified Oswestry Disability Index (ODI) and visual analogue scale (VAS). ODI is one of the most commonly used scales for evaluating individuals with LBP. The ODI consists of 10 items addressing how LBP affects the individuals' ability in everyday life (14, 15). Each item is rated from 0 to 5 points, with higher values representing greater disability. Validation of the ODI for the Turkish population was carried out previously (16). In addition, duration of injury, level of injury, and level of functional independence for the patients nursed by the caregivers were assessed, and the patients were examined according to the International Standards for Neurological Classification of Spinal Cord Injury.

The Functional Independence Measure (FIM) scale was used to determine the level of functional independence. This scale consists of 18 items, of which 13 are for motor and 5 are for cognitive functions. These items involve self-care, sphincter control, transfer (transfer to bed, chair, rest room, and bath), locomotion, communication, social relations, and cognition. Each of these 18 items is rated on a 7-level ordinal scale, with 1 indicating complete dependence, and 7 indicating complete independence (17). The adaptation, validation and reliability study of FIM for the Turkish population was also performed previously (18). In the present study, only the self-care, transfer and locomotion items of the FIM were used.

Statistical analysis

Statistical analysis was performed using the Statistical Program for Social Sciences (SPSS, Inc., Chicago, IL, USA) version 15.0. Frequency tables were used for categorical variables, whereas descriptive statistics were used for numerical variables of the sample, which was divided into study and control groups. In comparison of the groups, a χ^2 test and Monte-Carlo simulation were used where appropriate for categorical variables. A Mann-Whitney U test was used for the comparisons of numerical variables because they were not normally distributed. The relationship between the severity scores of LBP was evaluated using Spearman's correlation. A p-value < 0.05 was considered statistically significant.

Table II. *Visual analogue scale (VAS) and Oswestry Disability Index scores of those with low back pain both in the study group (caregivers) and control group*

	Study group ($n=58$)	Control group ($n=24$)	p-value
VAS score, mean (SD)	5.64 (1.63)	3.96 (1.67)	<0.001
Oswestry score, median	28.08 (12.63)	24.08 (12.7)	0.196

SD: standard deviation; min: minimum; max: maximum.

Table III. *ASIA Impairment Scale (AIS) grades of the patients with spinal cord injury*

AIS grades	*n* (%)
A	68 (68)
B	9 (9)
C	17 (17)
D	6 (6)
Total	100 (100)

ASIA: American Spinal Injury Association.

RESULTS

The study group comprised 100 caregivers (29 males and 71 females; mean age 37.8 years (standard deviation (SD)13.5)) and the control group comprised 87 healthy subjects (26 males and 61 females; mean age 38.4 years (SD 12.7)). There were no significant differences between the groups in terms of age, gender or BMI. The demographic characteristics of both groups are shown in Table I. The 1-year prevalence of LBP was significantly higher among caregivers compared with the control group ($p<0.001$, Table I). With respect to pain characteristics, LBP was the most common (77.6%), whereas the frequency of radicular pain spreading to the legs was lower (22.4%). When the groups were compared in terms of VAS and ODI scores, VAS scores were significantly higher among caregivers, whereas there were no significant differences between groups in terms of Oswestry scores (Table II). The spinal cord lesion was in the cervical region in 30 patients with SCI, the thoracic region in 61, and the lumbar region in 9. There were 77 patients with motor complete lesion and 23 with motor incomplete lesion. The ASIA Impairment Scale (AIS) grades of the patients are shown in Table III. There was a significant association between LBP of the caregivers and lesion level, AIS grades and duration of injury of the patients. The prevalence of LBP was higher among caregivers of those with complete lesion and with long injury duration ($p=0.04$ and $p=0.004$, respectively; Table IV). LBP was also associated with FIM scores of the patients with SCI.

The level of functional independence of patients (self-care, transfer, mobility) nursed by caregivers with LBP was signifi-

Table IV. *Correlation of low back pain (LBP) of caregivers with ASIA Impairment Scale (AIS) grades and duration of the injury of patients with spinal cord injury (SCI*)

	Caregivers with LBP	Caregiver without LBP	p-value
AIS grades, *n* (%)			
A	40 (69.0)	28 (66.7)	
B	8 (13.8)	1 (2.4)	
C	9 (15.5)	8 (19.0)	
D	1 (1.7)	5 (11.9)	
Total	58 (100)	42 (100)	0.04
Duration of SCI, months, mean (SD)	20.1 (6.9)	12.2 (6.9)	0.004

AIS grades were evaluated using χ^2 test (Monte Carlo method), whereas the duration of injury was evaluated via independent t-test.
ASIA: American Spinal Injury Association; SCI: spinal cord injury; ASIA: American Spinal Injury Association.

Table V. *Low back pain (LBP) and Functional Independence Measure (FIM) scores*

	Caregivers with LBP ($n=58$) Median (min–max)	Caregivers without LBP ($n=42$) Median (min–max)	p-value
FIM self-care	20 (3–40)	28 (6–42)	<0.001
FIM locomotion	5 (2–18)	10 (3–21)	<0.001
FIM mobility	4 (0–10)	7 (2–21)	<0.001

min: minimum; max: maximum.

cantly lower than that of patients nursed by caregivers without LBP ($p<0,001$, Table V).

DISCUSSION

LBP is a common problem among healthcare workers, particularly among nurses, due to their occupations, and there have been a considerable number of studies on this subject. The one-year prevalence of LBP has been reported to be 46–77% in the studies investigating LBP among nurses (8, 19–21). The lifetime prevalence of LBP has been reported to be 48.2%, one year prevalence 31.5% and point prevalence 11.5% among industrial workers, whereas the one year prevalence of LBP was found to be 54.9% among policemen after they began working (22, 23). The most important risk factors for LBP among policemen were: using heavy equipment, driving, physical requirements of the job, poor ergonomics, and inadequate physical adaptation (3). In the present study, the one-year prevalence of LBP was significantly higher among caregivers (58%) compared with age- and BMI-matched controls (27.6%). The prevalence of LBP was also higher among caregivers of SCI patients with long duration of injury; i.e. LBP was associated with caregiving duration. This was attributed to activities that cause LBP having been carried out for a long time.

The present study showed that LBP of caregivers was associated with the severity of the patient injury. LBP was more common among caregivers of patients with motor complete lesion identified according to the AIS. The FIM levels of patients were also associated with LBP of caregivers; the FIM scores concerning self-care, transfer and locomotion of the patients nursed by caregivers with LBP were significantly lower than those of patients nursed by caregivers without LBP ($p<0.001$). As there are no auxiliary devices or mechanical patient lift systems in our centre for the transfer of patients with SCI, manual handling of patients is common. A high frequency of LBP among caregivers of patients with low FIM scores was thus an expected result. The use of mechanical patient lift systems is advantageous in reducing the load on the low back, and healthcare workers are recommended to use these systems (24, 25). Similar to the present study, the frequency of LBP was reported to be higher among caregivers of patients with high levels of dependence in a previous study (26). In their study, Tong et al. (4) investigated LBP among female caregivers of children with physical disabilities and compared them with caregivers of children with endocrinological problems. In that study, the prevalence of LBP was higher among the caregivers of children with physical disabilities (71.1%) compared with caregivers of children with endocrinological problems (43.5%). Moreover, Tong et al. (4) also reported that the prevalence of LBP was higher among caregivers of children with low FIM for Childern (WeeFIM) scores compared with caregivers of children with high WeeFIM scores, consistent with the results of the present study.

This study also evaluated the severity of pain, using a VAS. The VAS scores were significantly higher among caregivers with LBP compared with control subjects with LBP (5.64 (1.6) vs. 3.96 (1.67); $p<0.001$). No significant differences in ODI scores were found between caregivers and control group ($p=0.196$). ODI also includes criteria such as travel and social activities. However, the effect of these criteria cannot be shown in the disability scales of caregivers of patients with SCI, although they may have pain that negatively affects their lives, because their lives do not include these activities. Based on these data, we conclude that the ODI scale is not adequate to evaluate disability due to LBP in certain groups and that there is a need for more sensitive scales for special groups to be developed.

In conclusion, LBP is a common problem among caregivers of patients with SCI, which appears to be associated with nursing duration as well as the functional independence level of the patient. LBP among caregivers is a public health problem, and subjects should be informed about this. There is a need for scales to be developed to evaluate the effect of LBP on the lives of caregivers of patients with SCI.

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