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CLINICAL ARTICLE

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The Implication of Low Back Pain and Its Severity in Young Male Soldiers of Republic of Korea

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Objective: Low back pain is common in South Korean soldiers, due to their arduous military training and physical activity. The aim of this study is to determine factors affecting the degree of low back pain in young male soldiers including objective radiological findings. **Methods:** From November 2014 to March 2015, 262 patients with recently developed symptoms were enrolled. The patients completed a questionnaire. Questionnaire and information from MRI, X-ray and computed tomography images were reviewed. The VAS-LBP, VAS-RP, and ODI were evaluated to assessment the degree of symptoms. All patients were males in their 10 s and 20 s (range 18–28 years). **Results:** All patients were males in their 20 s (median age 21 years, range 18–28 years). Military rank included private soldiers (n=29, 12.3%), private first-class (n=93, 39.4%), corporals (n=63, 26.7%), sergeants (n=38, 16.1%), and executive members over officers (n=13, 5.5%). Symptoms, other risk factors, and radiologic findings were compared. We could not reach statistically significant result for any risk factors for degenerative lumbar disc disorder. Military rank was negatively related with the degree of pain, although there was no difference of severity of degenerative lumbar disc disorder between each rank. **Conclusion:** Military rank was a considerable social factor associate with the degree of low back pain in young male soldiers. Careful evaluation and treatment with systematic management of soldiers with low back pain seems prudent.

Key Words: Lumber disc degeneration; Lumber disc herniation; Young; Military.

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INTRODUCTION

South Korea (Republic of Korea) maintains a military presence because it is at armistice state with North Korea (Democratic People's Republic of Korea). There is a mandatory military enlistment system exists in South Korea. According to the Ministry of National Defense, about 90% of Korean men have performed 2 years of mandatory military service. During the 2 years of military service, medical care is provided as a public health service offering for free.

Low back pain is very common symptom in South Korean soldiers and the likely result of arduous military training and physical activity. Low back pain has a great portion in military medicine, and its portion is growing[15,18,19]. Much time and money are spent diagnosing and treating soldiers with low back pain, which can remove soldiers from action. Most soldiers had not experienced low back pain prior to their military service. These patients do not usually have significant degenerative changes in the spine, as biomechanical stress is a typical cause of low back pain. Low back pain involves a complex combination of symptoms associated with physiological, psychological, and behavioral factors[1,13,14,24]. Low back pain can be aggravated by psychological factors and reluctance to seek treatment; thus, symptoms in military personnel may not be adequately addressed. Radiological findings do not always correlate with clinical findings, making it occasionally very difficult to clarify symptoms because of the various psychological factors including secondary gains associated with military life[1,4,16,17,28].

The aim of this study was to determine factors affecting the degree of low back pain in young male soldiers including objective radiological findings. In addition, we investigated social and environmental factors in military life.

MATERIALS AND METHODS

Patients were visited our outpatient department of military hospital. A total of 262 patients with low back pain as a newly emerging symptom and chief complaint indicative of intervertebral disc herniation who had received lumbar magnetic resonance imaging (MRI) for the first time from November 2014 to March 2015, 262 patients were enrolled. All patients had complained of low back pain for more than 3 months. Patients with acute pain due to trauma, such as slip down, fall down, traffic accident etc.−were not included. Twenty-one patients were excluded due to a lack of a computed tomography (CT) or simple X-ray image, and five patients were excluded for an incomplete questionnaire. Finally, 236 patients were enrolled in this study.

The questionnaire included information about enlisted date, military rank, assigned position and specialty, military physical examination grade, and current symptoms. The visual analogue scale (VAS) for low back pain (VAS-LBP), VAS for radiating pain (VAS-RP), and the Oswestry Disability Index (ODI) were evaluated to assess symptoms. All data were culled prospectively from an acquired patient database. Written informed consent was obtained from all subjects. The subjects were carefully screened using a modified low back pain questionnaire and history taking. Previous studies[2,20,21] revealed that lumbar disc degeneration is significantly associated with overweight. However, body mass index was not a consideration in the present study, as overweight and obese individuals are prevented from military service, in advance.

The study protocol was reviewed and approved by the institutional review board of the Korean Military Medical Research Project (AFMC-15001-IRB-15-001) and was adhered to the recommendations for biomedical research involving human subjects under the Declaration of Helsinki (1975).

Radiographic and MRI evaluation

MRIs were acquired in each patient using standard 1.5T scanners and were included T2-weighted sagittal and axial images.

Disc herniation

Disc herniation was assessed on a T2-weighted axial image of the index disc levels. It was classified as 1) normal (when the disc did not reach beyond the borders of the adjacent vertebral bodies), 2) bulging (circumferential, symmetric disc extension around the vertebral border), 3) protrusion (focal or asymmetric disc extension beyond the vertebral border with the base against the parent disc broader than any other diameter of the protrusion), 4) extrusion (focal and obvious disc extension beyond the vertebral border, with the base against the parent disc narrower than the diameter of the extruded material itself) with previously defined terminology[23].

Disc degeneration

Disc degeneration was assessed quantitatively based on nucleus pulposus signal intensity. Nucleus pulposus signal intensity was measured on T2-weighted mid-sagittal images, according to the modified Pfirrmann grading system.[11]

Other pathology

The morphological type of lumbosacral transitional vertebra (LSTV) was identified based on a previously described classification[6]. Castellvi described a radiographic classification system identifying four types of LSTV based on morphological characteristics. Type I includes unilateral (Ia) or bilateral (Ib) dysplastic transverse processes, measuring at least 19 mm in width. Type II exhibits incomplete unilateral (IIa) or bilateral (IIb) lumbarization/sacralization with an enlarged transverse process that has a pseudo-arthrosis between itself and the sacrum. Type III describes unilateral (IIIA) or bilateral (IIIb) lumbarization/sacralization with complete osseous fusion of the transverse process to the sacrum. Type IV involves a unilateral pseudo-arthrosis with osseous fusion on the contralateral side[6]. Type I has been considered a variation of normal due to the presence of a mobile disc caudal to the vertebra and was not defined as a transitional vertebra in this study. Spondylolysis was diagnosed by oblique view of lumbar x-ray or CT scan.

Statistical analysis

Spearman's rho test was used to detect correlations between variables. The Mann-Whitney U-test was used to compare the effect of categorized risk factors. Statistical analyses were carried out using commercial software (SPSS, version 20; IBM, Armonk, NY, USA). A p-value<0.05 was considered significant.

RESULTS

All 236 patients were males in their 10s and 20s (median age, 21 years; range, 18−28 years). The military ranks were comprised of private soldiers (n=29, 12.3%), private first class (n=93, 39.4%), corporals (n=63, 26.7%), sergeants (n=38, 16.1%), and executive members over the rank of officer (n=13, 5.5%). All patients had specialties. Several work-related risk factors were considered based on specialty. Thirty-three (14.0%) patients were office workers, 43 (18.2%) were drivers and 155 (65.7%) had a specialty of heavy lifting. In the questionnaire responses, the median VAS-LBP score was 6 (range, 0−9) and the median VAS-RP score was 4 (range, 0−9). Fifty nine patients did not complain of radicular pain. The median ODI score was 32% (range, 2−90%). The CT scans and/or X-rays showed that 26 (11.0%) patients had spondylolysis and 16 (6.8%) had LSTV > grade 2. According to the modified Pfirrmann grading system, 27 patients (11%) were grade 1, 54 patients (23%) were grade 2, 53 patients (22%) were grade 3, 48 patients (20%) were grade 4, 44 patients (19%) were grade 5, and 10 patients (4%) were grade 6. There were no patients over grade 7 (Table 1).

Correlation between patient factors, pain, and MRI status

The VAS-LBP, VAS-RP, and ODI scores from the questionnaire and MRI status (modified Pfirrmann grade, disc herniation) were compared but no significant difference were detected. No difference was found between military rank and MRI status (modified Pfirrmann grade, disc herniation). Patients with lower military rank displayed significantly higher VAS-LBP, VAS-RP, and ODI score (p<0.001, <0.001, and=0.004, respectively) (Fig. 1). No associations were found between sitting, heavy lifting, and driving work-related functions and MRI status (modified Pfirrmann grade, disc herniation). However, patients with a risk factor of sitting had higher VAS-LBP, VAS-RP, and ODI scores (p<0.001, p=0.045, and p<0.001, respectively). Patients with a risk factor of heavy lifting had more higher VAS-LBP and ODI scores (p<0.001 and p=0.011, respectively) Suspicious

Table 1. Characteristics of patients and radiologic findings

	Patients number (n=236)
Age (median, range; yr)	21 (18–28)
Sex (male; n, %)	236, 100%
Military rank (n, %)	
Private soldiers	29 (12.3%)
Private first classes	93 (39.4%)
Corporals	63 (26.7%)
Sergeants	38 (16.1%)
Executive members (over officers)	13 (5.5%)
Military specialty (working risk factors) (n, %)	
Sitting (office working)	33 (14.0%)
Heavy lifting	155 (65.7%)
Driving	43 (18.2%)
Symptom	
VAS-LBP	
Median, range	6 (0–9)
VAS-RP	
Median, range	4 (0–9)
Yes/no	177/59
ODI (%)	
Median, range	32 (2–90)
<50/≥50	200/36
Radiologic findings	
CT or X-ray (n,%)	
Spondyloysis	26 (11.0%)
Lumbo-sacral transitional vertebra	16 (6.8%)
MRI	
Pfirrmann grading system (n, %)	
Grade 1	27 (11%)
Grade 2	54 (23%)
Grade 3	53 (22%)
Grade 4	48 (20%)
Grade 5	44 (19%)
Grade 6	10 (4%)
Disc herniation (n, %)	
Normal	69 (29.2%)
Diffuse bulging	75 (31.8%)
Protrusion	64 (27.1%)
Extrusion	28 (11.9%)

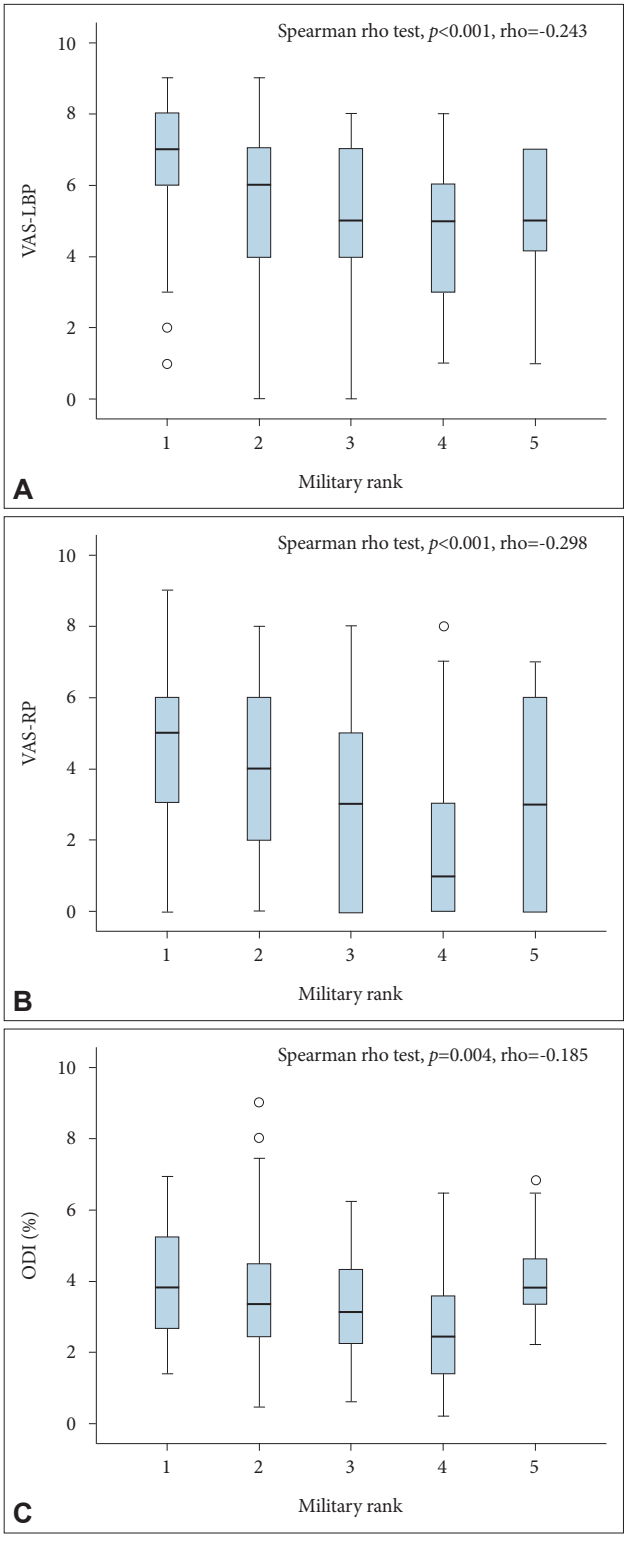

Fig. 1. Visual analog scale-low back pain scores (A), Visual analog scale-radiating pain scores (B), and Oswestry Disability Index (C) according to military rank showed a negative relationship. 1 : private soldiers; 2 : private first-class; 3 : corporals; 4 : sergeants; 5 executive members over officers.

Table 2. Correlation between risk factors (specialty, and radiologic findings) and symptom or MRI findings

Risk factors		VAS-LBP *p*-value	VAS-RP *p*-value	ODI *p*-value	Modified Pfirrmann grade *p*-value	Disc herniation (grade) *p*-value
Specialty						
Sitting (office working)	33 (14.0%)	<0.001*	0.022*	<0.001*	0.127	0.171
Heavy lifting	155 (65.7%)	<0.001*	0.148	0.005*	0.610	0.141
Driving	43 (18.2%)	0.386	0.449	0.350	0.616	0.444
Radiologic findings						
Spondylolysis	26 (11.0%)	0.442	0.221	0.454	0.806	0.066
LSTV	16 (6.8%)	0.392	0.198	0.164	0.071	0.420

LSTV : lumbosacral transitional vertebrae

risk factors from radiologic pathology (LSTV and spondylolysis) were compared with MRI status (modified Pfirrmann grade, disc herniation) and symptoms. However, no differences were observed between variables (Table 2).

DISCUSSION

Symptom and military rank

Lower ranking soldiers complain more of pain, perhaps reflecting their ongoing adaptation to their new circumstances[15]. The present study showed similar results. Lower ranked soldiers tended to have higher VAS scores; these individuals had a tendency to overstate their difficulties. We expected that the ODI would be more objective than the VAS. However, the ODI as a self-questionnaire had no value as an objective pain scale. Pain tolerance of lower ranked soldiers who must adapt to military service can be influenced by various factors. There is no doubt that motivation to serve is highly variable from individual to individual at their initial entry into the military. It is reasonable to assume that lower ranking soldiers have a decrease in perceived control of their environment. These soldiers subsequently report worse symptoms with similar radiographic pathology. However, no significant difference was observed between rank and MRI findings. This result contrasts with a previous study, which found a correlation between military rank and MRI findings[15]. Although this is a cross-sectional study, evidence of worsening of disc degeneration during military service is quite low.

Symptoms and radiologic findings

Radiological findings are sometimes regarded as more reliable and significant than clinical symptoms because they have a level of objectivity. However, symptoms do not always match radiological severity. Lumbosacral transitional vertebra is one of the most common congenital anomalies of the lumbosacral spine with a prevalence of 7–30%[7,8,27]. An association between the lumbosacral transitional vertebra and disc degeneration has been reported[3,22,25]. We did not find such an association. Spondylolysis occurs in 6% of the general population and approximately 75% of these cases will develop spondylolisthesis[5,26]. The present study showed no evidence of an association between spondylolysis and symptoms.

Care of low back pain during military service

An unfamiliar environment, isolation from family or society, and anxiety associated with adaptation to an obey-command society may be related to low back pain. We should not consider malingering to lower ranked soldiers who complain of low back pain. Military rank is an environmental or psychological factor associated with low back pain, and the physician should consider the situation of the patient.

It is not possible to perform a lumbar MRI on every patient due to cost; thus, careful selection of patients by history taking and physical examination is necessary. Several studies have reported the importance of early physiotherapy for patients with low back pain and provided encouraging results[19]. A "low back pain school" was first introduced nearly 40 years ago and has become popular[9]. The primary purpose of "low back pain school" is to educate patients about the physiology and movement of the spine and their influence on everyday life. The aim is to promote patient-oriented pain care[12]. Most (80–90%) patients with low back pain recover somewhat within 3 months with proper early physiotherapy[10]. Early physiotherapy can be an efficient treatment modality for patients with low back pain who have no lumbar lesions on MRI or for whom MRI has not been conducted and may have merit in military care. It is difficult to propose an ultimate solution for low back pain during military service. However systematic management with physiotherapy between the military hospital and medical corps could be an answer. This systematic management can provide continuous care for patients.

This study is limited by the small sample size and exclusive involvement of military personnel. A larger study is warranted before making definitive recommendations.

CONCLUSION

The aim of the study was to find out the cause of low back pain, especially focused in military unit. It revealed that lower ranked soldiers tend to overstate their pain intensity. It is difficult to provide adequate medical care objectively to those patients. Low back pain can be caused by multiple factors. And the physician should not ignore psychological and environmental factors.

It would be useful to encourage systematic management of physiotherapy through a low back pain school for patients with low back pain when reinforcing the relationship between medical corps dispensary and the military hospital.

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