Prevalence of spinal disorders and their relationships with age and gender

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ABSTRACT

الأهداف: تقدير مدى انتشار اعتلالات العمود الفقري المحولة للعلاج الطبيعي، ومعرفة العلاقة بين أكثر اعتلالات العمود الفقري شيوعاً والعمر والجنس.

الطريقة: أجريت هذه الدراسة في قسم العلاج الطبيعي بمستشفى الملك فهد الجامعي بالمملكة العربية السعودية. تم استرجاع ومراجعة بيانات الحاسوب لجميع الإحالات الإلكترونية الجديدة للمرضى على مدى فترة ثلاث سنوات (من يناير 2011م إلى ديسمبر 2013م). تضمنت بيانات الحاسوب معلومات ديموغرافية مثل الجنسية والجنس و العمر؛ وجهة الإحالة؛ ووصف المشكلة (التشخيص / الاعتلال).

النتائج: ألف و ستمئة و تسعة وستون (28.1%) من جميع الإحالات (5929) هي لمرضى يعانون من اعتلالات العمود الفقري. أكثر الاعتلالات شيوعاً كانت في الفقرات القطنية (53.1%) والفقرات العنقية (27.1%)، وكان الألم هو الأكثر شيوعاً في هذه الفقرات. ألم الرقبة (60.5%) كان أكثر شيوعاً في المرضى ذوي الأعمار أقل من 30 سنة (p<0.001)، في حين داء الفقار العنقي (30%) شائع في الفئات العمرية أكبر من 30 عاماً. داء الفقار وألم أسفل الظهر كانا أكثر انتشاراً في النساء (76.2% و 7.8%) من الرجال (3.3% و 73.9%).

الخاتمة: اعتلالات العمود الفقري شائعة نسبياً. آلام الرقبة وأسفل الظهر من المشاكل الأكثر شيوعاً ضمن اعتلالات العمود الفقري. وجدت علاقة ضعيفة بين العمر والجنس وبعض الاعتلالات التي تصيب الفقرات العنقية والقطنية.

Objectives: To establish the period prevalence of spinal disorders referred to physical therapy in a university hospital over a 3-year period, and to determine the relationships of common spinal disorders with patients' age and gender.

Methods: This retrospective study was conducted in the Physical Therapy Department, King Fahd Hospital of the University, Dammam, Saudi Arabia. Computer data of all new electronic referrals from January 2011 to December 2013 were retrieved and reviewed. The computer data included demographic information, referring facility, and diagnosis/disorder.

Results: One thousand six hundred and sixty-nine (28.1%) of all referred patients (5929) had spinal disorders. The most common disorders affected the lumbar spine (53.1%) and cervical spine (27.1%), and pain was the most common disorder. Neck pain (60.5%) was more common in patients <30 years old (p<0.001). Cervical spondylosis was common (~30%) in the >30 age groups. Spondylosis and low back pain were more prevalent in women (7.8% and 76.2%) than in men (73.9% and 3.3%).

Conclusion: Spinal disorders were common compared with other disorders. Low back pain and neck pain were the most common spinal disorders. Age and gender were weakly related to some of the disorders that affected the lumbar and cervical spine.

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Spinal disorders include a wide and heterogeneous spectrum of diseases that affect the vertebrae, intervertebral discs, facet joints, tendons, ligaments, muscles, spinal cord, and nerve roots of the spine.[1] Spinal disorders are classified based on etiology (namely, specific and non-specific spinal disorders) or according to the time course of the symptoms (namely, acute, subacute, or chronic).[1] Specific spinal disorders have clear etiologies and can be diagnosed based on

specific structural pathologies and clinical pictures (10-15%), whereas non-specific spinal disorders are primarily pain syndromes and are difficult to relate to pathomorphological sources. Most spinal disorders (ranging from 85-90%) are classified as non-specific.[1] Spinal disorders can include, but are not limited to pain syndromes, disc degeneration, spondylosis, radiculopathy, stenosis, spondylolisthesis, fractures, tumors, and osteoporosis. Spinal disorders have enormous economic and psychosocial effects. For example, low back pain (LBP) is a common spinal disorder and is the most common cause of disability in the population of the USA younger than 45 years old, the second most common reason for visits to a physician, the fifth most common cause of hospital admission, and the third most frequent cause of surgery.[2] Despite this fact, research investigating the epidemiology of these disorders is in its early stages relative to other disorders such as cancer and cardiovascular disorders.[3] Physical therapy is a "healthcare profession that assesses, diagnoses, treats, and works to prevent disease and disability through physical means."[4] "Physical therapists, doctors, and other health professionals often work as part of a team that plans and tailors treatment for a specific condition."[4] Physical therapists address patients with numerous diagnoses, including those affecting the spine. In Australia and the USA, physical therapists are the first-contact practitioner, which means that a physician's referral is not required for a patient to be treated by a physical therapist. In contrast, in Saudi Arabia, patients seeking physical therapy care need to be referred by a physician. Literature review revealed a lack of studies on the prevalence of the diagnoses and characteristics of patients with spinal conditions who are referred to physical therapy clinics in Saudi Arabia or even worldwide. Identifying the prevalence of spinal disorders can help guide resource allocation and subsequently improve the quality of care. Therefore, the current study aimed to 1) establish the period prevalence of spinal disorders that lead to referrals to the physical therapy clinic of a university hospital in Saudi Arabia, and 2) determine whether the patients' ages and genders play roles in the prevalence of the common spinal disorders.

Methods. This retrospective study was conducted at the Department of Physical Therapy, King Fahd Hospital of the University (KFHU), Alkhobar, Saudi Arabia. This department provides care to out- and in-patients from various specialties within the hospital and from other hospitals. Physical therapy services are provided to male and female patients daily. The KFHU has 600 beds and comprises 38 departments and clinics.[5] Ethical approval for this study was obtained from the Standing Committee for Research Ethics on Living Creatures at the University of Dammam.

Computer data from all the new (first visit) electronic referrals of patients attending the Department of Physical Therapy at KFHU over the 3-year period between January 2011 and December 2013 were retrieved and reviewed. The computer data used for the current study were only from the out-patient section. The retrieved data included demographic information (namely, nationality, gender, and age), the referring facility, and a diagnosis/disorder. Physicians referred some patients to physical therapy with the same disorder more than once. Therefore, data from patients with repeated disorders were excluded. Some disorders were re-coded from group similar terms into a unified term. For example, the term 'post C4-C5 and C5-C6 discectomy' and the term 'post laminectomy C2-C3' were re-coded as 'post cervical discectomy/laminectomy'. Another example is that the terms 'backache', 'back pain', and 'low back pain' were re-coded as 'low back pain'. The disorders were categorized based on the spinal region as follows: cervical, thoracic, lumbar, lumbosacral, sacral, coccygeal, sacroiliac, and other (unspecified region).

Statistical analyses. Statistical analysis was performed by the IBM SPSS Statistics for Windows version 19.0 (IBM Corp, Armonk, NY, USA). To identify the case prevalence, descriptive statistics of the frequencies in the data were computed. Chi-square with Cramer's V tests (rectangular tables) were used to investigate the relationships of the most common spinal disorders with age and gender. The level of statistical significance for these relationships was set at $p<0.05$.

Results. The physicians referral has a total of 5,929 out-patient cases to the Department of Physical Therapy at KFHU over a 3-year period (year 2011: 1939, year 2012: 1943, and year 2013: 2047). Of these, 1,669 (28.1%) cases had spinal disorders. **Table 1** illustrates the demographic characteristics of this population. Notably, approximately 50% of patients were in the 30-49 year-old age group, two-thirds were female, three-quarters were Saudis, and 50% were referred from the orthopedic department within the hospital.

Figure 1 shows a breakdown of numbers of disorders as categorized by spinal region. The most common

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disorders that were referred affected the lumbar spine (53.1%), cervical spine (27.1%); together, these regions represented 80.2% of all referrals. Combining the disorders related to the lumbosacral region (6.7%) with those related to the lumbar spine caused the percentage of disorders affecting the lumbar spine to increase to approximately 60%. **Figure 2** shows the common disorders that affected both the cervical and lumbar spines. Low back pain represented three-quarters of the disorders that affected the lumbar spine, and other disorders (such as spondylosis, disc disorders, and radiculopathy) did not exceed 10%. In contrast, the most common disorders related to the cervical spine were pain (36.8%), spondylosis (31.3%), and disc disorders (24.3%).

Table 2 shows the relationships between the patients' age and the common spinal disorders of the cervical and lumbar spines. There was a weak, but

Table 1 - Demographic characteristics of studied data among 1669 patients referred to the physical therapy department.

Parameter	n	(%)
Age (year)		
<30	255	(15.3)
30-49	790	(47.3)
50-69	572	(34.3)
≥70	52	(3.1)
Gender		
Male	587	(35.2)
Female	1082	(64.8)
Nationality		
Saudi	1318	(79.0)
Non-Saudi	351	(21.0)
Referring facility (3 missing data)		
Orthopedics	833	(50.0)
Neurology	316	(19.0)
Neurosurgery	320	(19.2)
Others (not specified)*	159	(9.5)
Others (specified)†	38	(2.3)

*Referring facilities were not specified on the system,
†These included cardiology, pediatrics, general surgery, obstetrics and gynecology, urology, internal medicine, and referrals from outside the hospital either from Saudi Ministry of Health or other facilities

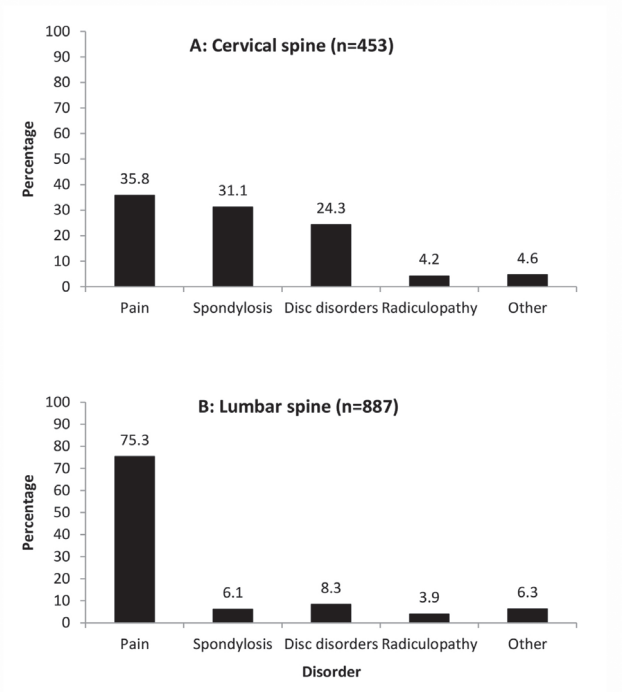

Figure 2 - Common disorders affecting both the A) cervical and B) lumbar spines. Pain was the most common disorder that affected both the cervical and lumbar spines.

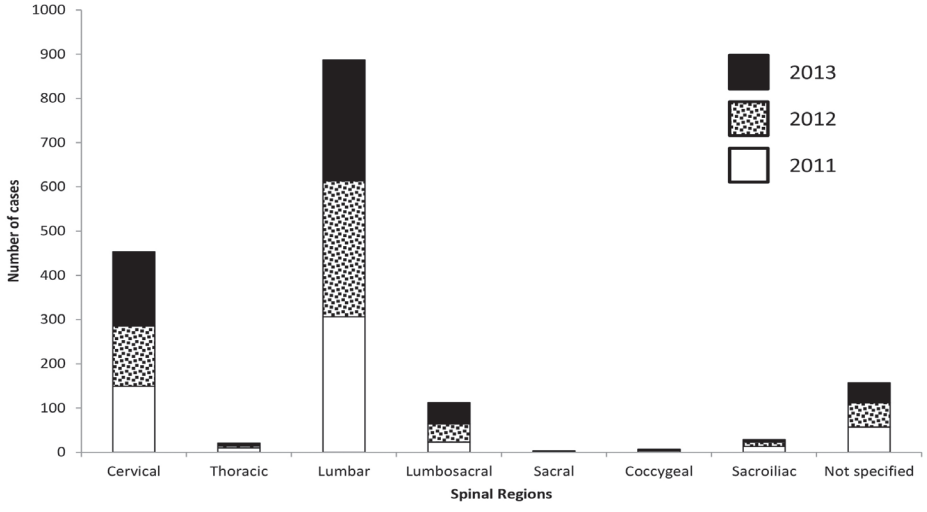

Figure 1 - Numbers of disorders categorized by spinal region and year.

statistically significant relationship between age and cervical spine disorders [Chi-square: x^2=54.73, df=12, Cramer's V=0.20, p<0.001]. Notably, neck pain (60.5%) was more common in patients below the age of 30 years than in older patients. The prevalence of cervical spondylosis was approximately 30% in the age groups <30 years. There was a stepwise increase in the prevalence of cervical disc disorders with increasing age; this prevalence ranged from 11.6% (age >30 years) to 38.5% (age ≥70 years). No statistically significant relationship was found between age and lumbar spine disorders [Chi-square: χ^2=13.155, df=12, Cramer's V=0.07, p=0.358].

Table 3 illustrates the relationships between patient gender and the common spinal disorders of the cervical and lumbar spines. There was no relationship between gender and cervical spine disorders [chi-square: χ^2=2.81, df=4, Cramer's V=0.08, p=0.590]. There was a statistically significant relationship between gender and lumbar spine disorders, although this relationship was weak [Chi-square: χ^2=22.06, df=4, Cramer's V=0.16, p<0.001]. Low back pain (76.2%) and spondylosis (7.8%) seemed to be more prevalent in female patients than in male patients (LBP 73.9% and spondylosis 3.3%). "Other" disorders were less prevalent in female (3.8%), than in male (10.5%) patients.

Discussion. The findings revealed that 28.1% of patients had spinal disorders. Most commonly affected was the lumbar spine (53.1%) followed by the cervical spine (27.1%). Low back pain (75.3%) was the most common disorder that affected the lumbar spine. Pain (36.8%), spondylosis (31.3%), and disc disorders (24.3%) were the most common disorders that affected the cervical spine. Generally, weak relationships of age and gender with some of the disorders of the lumbar and cervical spines were found.

As noted, neck, and LBP were the most common disorders of the cervical and lumbar spines. In a population-based study of 34,902 adult Danish twins, Leboeuf-Yde et al[6] found that LBP was the most common followed by the neck pain and then thoracic pain. The 3-month prevalence of back, or neck pain was 31% in a population-based survey of US adults >18

Table 2 - Common spinal diagnoses/disorders of cervical and lumbar spines among 1340 patients and their relation to patients' age.

Disorder	Less than 30		30-49		50-69		70 or more		Total	
	Cervical	Lumbar	Cervical	Lumbar	Cervical	Lumbar	Cervical	Lumbar	Cervical	Lumbar
Pain	26 (60.5)	103 (83.1)	78 (37.7)	321 (74.1)	55 (28.9)	220 (74.3)	3 (23.1)	24 (70.6)	**162 (35.8)**	**668 (75.3)**
Spondylosis	3 (7.0)	1 (0.8)	73 (35.3)	29 (6.7)	61 (32.1)	21 (7.1)	4 (30.8)	3 (8.8)	**141 (31.1)**	**54 (6.1)**
Disc disorders*	5 (11.6)	8 (6.5)	45 (21.7)	38 (8.8)	55 (28.9)	26 (8.8)	5 (38.5)	2 (5.9)	**110 (24.3)**	**74 (8.3)**
Radiculopathy	1 (2.3)	3 (2.4)	4 (1.9)	21 (4.8)	14 (7.4)	10 (3.4)	0 (0.0)	1 (2.9)	**19 (4.2)**	**35 (3.9)**
Other†	8 (18.6)	9 (7.3)	7 (3.4)	24 (5.5)	5 (2.6)	19 (6.4)	1 (7.7)	4 (11.8)	**21 (4.6)**	**56 (6.3)**
Total	**43 (100)**	**124 (100)**	**207 (100)**	**433 (100)**	**190 (100)**	**296 (100)**	**13 (100)**	**34 (100)**	**453 (100)**	**887 (100)**

*Disc disorders for cervical spine included disc degeneration, disc displacement/prolapse, and disc disease with myelopathy; whereas disc disorders for lumbar spine included disc with radiculopathy, disc displacement/prolapse, and disc disease with myelopathy. †Other disorders for cervical spine included: root lesion, fracture, spondylolisthesis, torticollis, sprain, postural deformity, muscle spasm, myelopathy, and post discectomy/laminectomy; whereas other disorders for lumbar spine included stenosis, spine disease, fracture, scoliosis, spondylolisthesis, retrolisthesis, and post discectomy/laminectomy. Data are expressed as number and percentage (%).

Table 3 - Common spinal diagnoses/disorders of cervical and lumbar spines among 1340 patients and their relation to patients' gender.

Disorders	Male		Female		Total	
	Cervical	Lumbar	Cervical	Lumbar	Cervical	Lumbar
Pain	41 (33.1)	246 (73.9)	121 (36.8)	422 (76.2)	**162 (35.8)**	**668 (75.3)**
Spondylosis	38 (30.6)	11 (3.3)	103 (31.3)	43 (7.8)	**141 (31.1)**	**54 (6.1)**
Disc disorders*	30 (24.2)	29 (8.7)	80 (24.3)	45 (8.1)	**110 (24.3)**	**74 (8.3)**
Radiculopathy	8 (6.5)	12 (3.6)	11 (3.3)	23 (4.2)	**19 (4.2)**	**35 (3.9)**
Other†	7 (5.6)	35 (10.5)	14 (4.3)	21 (3.8)	**21 (4.6)**	**56 (6.3)**
Total	**124 (100)**	**333 (100)**	**329 (100)**	**554 (100)**	**453 (100)**	**887 (100)**

*Disc disorders for cervical spine included disc degeneration, disc displacement/prolapse, and disc disease with myelopathy; whereas disc disorders for lumbar spine included disc with radiculopathy, disc displacement/prolapse, and disc disease with myelopathy, †Other disorders for cervical spine included: root lesion, fracture, spondylolisthesis, torticollis, sprain, postural deformity, muscle spasm, myelopathy, and post discectomy/laminectomy; whereas other disorders for lumbar spine included stenosis, spine disease, fracture, scoliosis, spondylolisthesis, retrolisthesis, and post discectomy/laminectomy. Data are expressed as number and percentage (%).

years.[7] Elfering and Mannion[1] reported that neck pain and LBP were the most common symptoms among non-specific spinal disorders. Work-related disability from non-specific spinal disorders is epidemic, and although only a minority of the patients are chronically disabled, these patients are responsible for most of the care costs.[1] The lifetime prevalence of LBP was reported to be 75-85%, the 12-month prevalence was 15-45%, the 12-month incidence was as high as 20%, and the yearly recurrence rate was reported to be as high as 60%.[1] A recent systematic review of the global prevalence of LBP found that the point prevalence was 11.9% and the one-month prevalence was 23.2%.[8] In a systematic review of 56 epidemiological studies of a world population, Fejer et al[9] found that neck pain was common with a mean point (namely, at any given time) prevalence of 7.6%, a mean one-week prevalence of 12.5%, a mean one-month prevalence of 23.3%, a mean 6-month prevalence of 29.8%, a mean one-year prevalence of 37.2%, and a mean lifetime prevalence of 48.5%.[9] Cervical spondylosis occurred in 13.1% of 47,560 patients who were included in a study from USA between 2006 and 2011.[10] They observed a prevalence of cervical spondylosis in 31% patients with thoracolumbar spinal deformities.[10]

The present study revealed that neck pain (60.5%) was more common among patients <30 years than in older patients. A systematic review[11] identified studies of idiopathic adolescent spinal pain and found that spinal pain was the most commonly reported measure with a lifetime prevalence that ranged from 4.7-74.4%. The lifetime prevalence of LBP in adolescents ranges from 7-72%.[11] A national prevalence study from the USA, found that LBP, neck pain, and LBP and neck pain were more common in women and among older age groups.[7] Neck pain and LBP exhibited a mild peak near middle age.[6] Our study found that LBP was more prevalent in female patients than in male patients. This finding supports the findings of the systematic review of the global prevalence of LBP conducted by Hoy et al[8] and the findings of a Danish study by Leboeuf-Yde et al.[6] The current study also found that lumbar spondylosis was more prevalent in women than in men. A Japanese cohort study[12] that included 2288 participants aged >60 years found that the prevalences of radiographic spondylosis with Kellgren/Lawrence (KL) grade >2 at the severest intervertebral level was 75.8% and grade >3 was 50.4%. This prevalence was 28.8% in patients with LBP. Interestingly, KL >2 spondylosis was more prevalent in men, whereas KL >3 spondylosis and LBP were more prevalent in women. Although KL 2 spondylosis was not significantly more strongly associated with LBP than KL 0 or KL 1 spondylosis, KL >3 spondylosis was related to pain only in the female patients.[12]

Spinal disorders that lead to referrals to physical therapy, particularly disorders affecting the lumbar and cervical spines, are common. This information might help practitioners and decision-makers to direct their resources to provide special care for patients with these disorders to improve the quality of care and lower costs. Several methods might achieve such improvements. Paskowski et al[13] implemented a multidisciplinary spine care pathway that utilizes an evidence-based standardized process and observed improvements in the clinical outcomes and reductions in costs associated with diagnosis and treatment. Personalized and coordinated multidisciplinary care target the biopsychosocial aspects of improving health care and reduce costs.[14] A recent systematic review[15] concluded that physical therapy via direct access improved patient outcomes and decreased costs compared with referral-based physical therapy.

Study limitations. The limitation of our study was that the computer data lacked some important demographic data, such as patients' weights and heights, smoking histories, marital statuses, and occupations. Research has shown that these demographic features are associated with spinal disorders, particularly LBP and neck pain.[16] The referring physicians used different terms for the same disorders; 'backache' and 'lumbago' or 'radiculopathy' and 'radicular syndrome.' Therefore, we re-coded such similar term into unified terms that might influenced the results as this re-coding was subjective.

The current study established evidence on the prevalence of spinal disorders and their relationships with age and gender in patients who were referred to a physical therapy clinic. Approximately 28% of patients had spinal disorders. More than half of these disorders affected the lumbar spine and more than a quarter affected the cervical spine. Low back pain was the most common disorder that affected the lumbar spine, whereas pain, spondylosis, and disc disorders were the most common disorders that affected the cervical spine. Weak relationships of age and gender with some of these disorders were found. Studies from other institutions and other nations will enhance our knowledge in this area of research. Additionally, further research might investigate the mechanisms of the risk factors and preventive outcome measures for common spinal disorders.

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