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Is comorbidity related to the independence of patients with spinal cord injury?

Omurilik yaralanmalı hastalarda komorbidite bağımsızlık ile ilişkili midir?

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Abstract

Aim: Apart from the complications of spinal cord injury, some comorbidities in patients with this injury should be considered in the long term. In this study, we aimed to identify the comorbidities in patients with chronic spinal cord injury and the relationship of these comorbidities with the patients' level of independence.

Methods: This retrospective cohort study involved 40 patients who had spinal cord injury and were admitted to an inpatient rehabilitation program at our hospital between March 2014 and January 2016. The participants were evaluated in terms of age, height, weight, body mass index, place of residence, and marital status. Their type, level, and duration of injury were also assessed. ASIA Impairment Scale (AIS), Functional Independence Scale (FIM), Functional Ambulation Scale (FAS), Spinal Cord Independence Scale (SCIM), and Cumulative Illness Rating Scale (CIRS) were used to evaluate the patients.

Results: The mean age of the 40 patients with chronic spinal cord injury was 41.83 (16.87) years. Their most common comorbidities were genitourinary (62.5%), lower gastrointestinal (50%), and ophthalmological–otolaryngologic problems (42.5%). No correlation was found between the CIRS scores and the SCIM Personal Care, Respiratory and Sphincter Management, Mobility, and the total SCIM scores of the participants. (P=0.949, P=0.469, P=0.452, P=0.521, respectively). By contrast, the FIM scores were correlated with the SCIM scores of the cases (P=0.014).

Conclusion: The most common long-term comorbidities in patients with spinal cord injury were genitourinary, lower gastrointestinal, and ophthalmological–otolaryngologic problems. However, these comorbidities were not directly related to the patients' ambulation and independence levels.

Keywords: Spinal cord injury, Comorbidity, Independence, Ambulation

Öz

Amaç: Omurilik yaralanması ile yaşayan bireyler de gelişebilecek komplikasyonlar dışında birtakım komorbiditelerde uzun vade de göz önünde bulundurulmalıdır. Bu çalışmada kronik omurilik yaralanmalı hastalarda görülebilecek komorbiditelerin tanımlanması ve bunların bağımlılık düzeyi ile ilişkisini incelemeyi amaçladık.

Yöntemler: Mart 2014-Ocak 2016 tarihleri arasında hastanemizde omurilik yaralanması nedeni ile yatarak rehabilitasyon programına alınan 40 olgu ile retrospektif kohort çalışma yapıldı. Katılımcılar; yaş, boy, kilo, vücut kitle indeksi, yaşadığı yer, medeni hal vb. demografik yönden değerlendirildi. Yaralanma şekli, yaralanma seviyesi, yaralanma süresi ile ASIA Bozukluk Skalası (AIS), Fonksiyonel Bağımsızlık Ölçeği (FBÖ), Fonksiyonel Ambulasyon Skalası (FAS), Spinal Kord Bağımsızlık Ölçeği (SBÖ) ve Kümülatif Hastalık Değerlendirme Ölçeği (CIRS) ölçekleri ile de değerlendirildi.

Bulgular: Yaş ortalamaları 41,83 (16,87) olan toplam 40 kronik omurilik yaralanmalı hasta çalışmaya dahil edildi. En sık görülen komorbiditeler; genitoüriner sistem problemleri (%62,5), alt gastrointestinal sistem problemleri (%50), oftalmolojik-otolaringolojik problemler (%42,5) olarak görüldü. Çalışmaya katılan olguların CIRS skorları ile FBÖ skorları ve SCIM skorları ile arasında istatistiksel olarak anlamlı ilişki saptanmamıştır (sırasıyla P=0,949, P=0,469, P=0,452, P=0,521). Olguların FBÖ skorları ile SCIM skorları arasında pozitif yönlü ilişki istatistiksel olarak anlamlı bulunmuştur (P=0,014).

Sonuç: Omurilik yaralanmalı hastalarda uzun dönemde en sık görülen komorbiditeler; genitoüriner sistem problemleri, alt gastrointestinal sistem problemleri, oftalmolojik-otolaringolojik problemlerdir. Komorbiditelerin, ambulasyon düzeyi ve bağımsızlık düzeyi ile doğrudan ilişkisi bulunmamıştır.

Anahtar kelimeler: Omurilik yaralanması, Komorbidite, Bağımsızlık, Ambulasyon

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Introduction

The vast majority of individuals who have had a spinal cord injury (SCI) face disability-related challenges. Such patients are strictly followed for care, complications, and social and psychological wellbeing after having had an SCI [1]. These patients may have had existing illnesses before getting an SCI. Moreover, being in such a chronic condition, in the long term, they may face numerous health problems that may develop due to the injury, addiction, or aging [2,3]. SCI is associated with numerous factors, such as current risk factors, genetic predisposition, daily life activities, and predisposing factors associated linked with the injury. However, the already existent comorbidities or those developing with time in these individuals are ignored.

Although many studies have examined the complications of SCI, we could not find in the literature a study examining the comorbidities associated with SCI and their effect on patients' independence [4]. Thus, this study aimed to identify the comorbidities in patients with SCI and examine their relationship with the patients' independence.

Materials and methods

This study involved 40 patients who have had SCIs and were admitted for the inpatient rehabilitation program in Erenkoy Physical Therapy and Rehabilitation Hospital between March 2014 and January 2016. The participants were analyzed in terms of age, height, weight, body mass index, place of residence, and marital status, and assessed using the ASIA Impairment Scale (AIS), Functional Ambulation Scale (FAS), Functional Independence Measurement (FIM), Spinal Cord Independence Measurement (SCIM), and Cumulative Illness Rating Scale (CIRS). AIS is a standard neurological evaluation method used to assess patients with SCI, which classifies SCI into five categories from A to E. AIS A indicates full motor (complete) motion and sensory loss, AIS B indicates incomplete sensory loss, AIS C and D indicate an incomplete motor loss and AIS E indicates normal motor motion and sensation [5]. The FAS evaluates a patient's sit-up activity, lower limb strength, and dynamic balance. It involves a scale of 0 to 5, 0 indicating the patient's inability to walk and 5, the patient's ability of walking independently [6]. The FIM is an 18-item measurement tool that evaluates the physical, psychological, and social functions of an individual. Also, it evaluates a patient's disability level and the progress in the patient's response to rehabilitation or medical intervention [7]. The SCIM was developed to address three specific functional areas in patients with spinal cord injuries: self-care (nutrition, care, bathing, and dressing), respiratory and sphincter management, and mobility (bed and transfers and indoor/outdoor). Scores range from 0 to 100, wherein 0 indicates total dependency, and 100 indicates complete independence. Each subscale score was evaluated on a 100-point scale (self-care: 0–20; respiratory and sphincter management: 0–40; and mobility: 0–40) [8]. The CIRS is a short, comprehensive, and reliable scale used to assess physical impairment. This scale divides the body systems into 13 subsections [9].

Inclusion criteria were determined as being over 18 years, having had SCI at least six months ago, having signed the consent form to give permission for the use of her/his data at the time of hospitalization or treatment, and not having had other injuries concurrent with the SCI. Exclusion criteria included patients with syringomyelia, ischemic cardiac pathology, osteoporotic fracture, dependence on a mechanical ventilator, acute cancer process, or recently emerging pressure ulcers.

Written permission was obtained from our hospital, and approval was obtained from Erenkoy Mental and Neurological Diseases Training and Research Hospital Ethics Committee (2019/62). Written informed consent was obtained from all participants, and all procedures regarding the study were performed in accordance with the principles of the Helsinki Declaration of the World Medical Association.

Statistical analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used when evaluating the study data. The suitability of quantitative data for normal distribution was tested by the Shapiro-Wilk test and graphical examinations. Independent groups t-test was used for comparison of two groups of quantitative variables with a normal distribution, and Mann-Whitney U test was used for comparisons between two non-normally distributed groups of quantitative variables. Kruskal-Wallis and Dunn-Bonferroni tests were used for comparison of more than two groups of quantitative variables that did not show normal distribution. Pearson correlation analysis and Spearman correlation analysis were used to evaluate the relationships between quantitative variables. Statistical significance was considered as $P < 0.05$.

Results

This study included a total of 40 cases aged 15–75 years (average age: 41.83 (16.87) years). Table 1 shows the distribution of the demographic and clinical characteristics of the patients, whereas Table 2 shows the distribution of the CIRS.

The relationship between the FIM scores with the CIRS and SCIM scores were shown in Table 3. No correlation was observed between the FIM scores with CIRS scores (P=0.931), and a significant difference was observed between the FIM scores and the total SCIM scores (r=0.384; P=0.014). The FIM scores were positively correlated with the SCIM Respiratory and Sphincter Management subscale scores (r=0.333; P=0.036). Similarly, the FIM scores were positively correlated with the SCIM Mobility subscale scores (r=0.507; P=0.001). No correlation was found between the FIM scores and the SCIM Personal Care subscale scores (P=0.322).

The relationship between the CIRS scores and the SCIM scores were shown in Table 4. No correlation was found between the CIRS scores and the SCIM Personal Care, Respiratory and Sphincter Management, Mobility, and total SCIM scores (P=0.949, P=0.469, P=0.452, P=0.521, respectively).

Table 1: Demographic and clinical characteristics

		n (%)
Age (year)	Min-Max(Median)	15-75 (40)
	Mean(SD)	41.83(16.87)
Height(m)	Min-Max(Median)	1.5-1.93 (1.69)
	Mean(SD)	1.67(0.10)
Weight(kg)	Min-Max(Median)	50-116 (74)
	Mean(SD)	73.08(13.36)
BMI (kg/m^2)	Min-Max(Median)	19.03-39.21 (26.00)
	Mean(SD)	26.16(3.77)
Marital status	Married	24 (60.0)
	Single	16 (40.0)
Residence	Home	35 (87.5)
	Institution	5 (12.5)
Level	C5	2 (5.0)
	C6	2 (5.0)
	C7	4 (10.0)
	C8-T1	4 (10.0)
	T2-T10	19(47.5)
	T11-L2	9 (22.5)
Type of injury	Traumatic	33 (82.5)
	Nontraumatic	7 (17.5)
Time from injury	Min-Max(Median)	9-240 (48)
	Mean(SD)	62.48(47.48)
AIS*	A	8 (20.0)
	B	17 (42.5)
	C	13 (32.5)
	D	2 (5.0)
Functional Independence Measurement (FIM)	Min-Max (Median)	52-120 (75)
	Mean (SD)	76.80(15.40)
Functional Ambulation Scale (FAS)	No	4 (10.0)
	Non-Ambulatory	6 (15.0)
	Therapeutic ambulation	16 (40.0)
	House ambulation	10 (25.0)
	Social ambulation	4 (10.0)

AIS:ASIA Impairment Scale

Table 2: Cumulative Illness Rating Scale (CIRS) Scores

	Yes	No
Cardiac	2 (5.0)	38 (95.0)
Vascular	8 (20.0)	32 (80.0)
Hematologic	9 (22.5)	31 (77.5)
Respiratory	6 (15.0)	34 (85.0)
Ophthalmological and otolaryngologic	17 (42.5)	23 (57.5)
Upper gastrointestinal system	13 (32.5)	27 (67.5)
Lower gastrointestinal system	20 (50.0)	20 (50.0)
Hepatic and pancreatic	0 (0.0)	40 (100.0)
Renal	3 (7.5)	37 (92.5)
Genitourinary	25 (62.5)	15 (37.5)
Musculoskeletal and dermatological	11 (27.5)	29 (72.5)
Neurological	8 (20.0)	32 (80.0)
Endocrine - Metabolic	9 (22.5)	31 (77.5)
Psychiatric	12 (30.0)	28 (70.0)

Table 3: The relationship between FIM scores with CIRS and SCIM scores

	FIM Score	
	[a]r	*P*-value
CIRS score	-0.014	0.931
SCIM		
Personal care	0.161	0.322
Respiratory and sphincter management	0.333	0.036
Mobility	0.507	0.001
SCIM total score	0.384	0.014

[a]r: Pearson correlation coefficient

Table 4: The relationship between CIRS scores with SCIM scores

	CIRS Scores	
	[a]r	*P*-value
Personal care	0.011	0.949
Respiratory and sphincter management	0.118	0.469
Mobility	0.122	0.452
SCIM total score	0.105	0.521

[a]r: Pearson correlation coefficient

Discussion

SCI creates experiences that suddenly alters the life of patients, their family and relatives. Many neurological and medical problems arise after the damage, and almost all bodily functions of the patient are affected. The aim of SCI rehabilitation includes maximizing physical independence, increasing the quality of life, and helping the patient assume productive and age-appropriate social roles. Determining the patient's expectations and achievable goals affect follow-up and treatment motivation [10]. In this process, the presence of comorbidities, in addition to the patient's SCI, is an issue that is neglected as a parameter that may affect this target. In this research, by reviewing the comorbidities of SCIs and their effects on independence, a contribution to the quality of life is aimed at the early diagnosis and treatment of comorbidities.

One of the essential problems encountered after an SCI is the loss of gastrointestinal function. Gastrointestinal system problems are among common societal health problems in epidemiological studies. The combination of two simultaneous conditions negatively affects the treatment. Another frequently seen problem is the loss of essential genitourinary function. Comorbidities related to genitourinary function are also common. Having comorbid problems increases morbidity and mortality in complications that may occur [11]. In our study, the most common cause of comorbidity in patients with SCIs was genitourinary problems. It was followed by lower gastrointestinal problems and ophthalmological and otolaryngologic problems. Although a rare loss of vision has been defined in the literature, many comorbid conditions can accompany it [12]. Considering the low prevalence of vision and hearing problems in the literature, the ratio of ophthalmological and otolaryngologic problems in our example was particularly striking [13-15]. We think that the high rate of ophthalmological and otolaryngologic problems seen in our study may be associated with aging (e.g., presbyopia, cataracts, senile hearing loss). There were also additional conditions due to SCIs that can negatively affect this population, such as autonomic dysreflexia or postural hypotension.

In individuals with chronic physical disabilities and ambulation difficulties, addictive social isolation occurs during daily life activities. This problem causes a decrease in life satisfaction and quality of life. In individuals with chronic physical disabilities, there was a relationship between functional independence and quality of life [16-17]. In our study, we obtained results in the direction of confirming this finding

Many studies have shown that comorbidities negatively affect the course of the disease and quality of life in different disease states. Quality of life is affected as comorbid diseases increase in patients with rheumatoid arthritis [18,19]. It has also been stated that quality of life is related to independence and mortality in hemodialysis patients [20-21].

In our study, we did not observe a significant relationship between SCIM and FIM with comorbidity in patients with SCI or with the level of ambulation. It is well-known that comorbid diseases increase with age [22]. Therefore, we think that the results may be related to the limited number of patients and our wide age range.

Limitations

Besides the number of patients and our wide age range, our limitation was that there is no scale for comorbidity in SCIs. CIRS' comorbidity assessment is not a scale that excludes possible complications of SCIs. In our study, we specifically mentioned that comorbidity was the identification of conditions not related to primary SCI that developed before or simultaneously in the course of the disease. However, studies carried out with an SCI-specific comorbidity scale will shed light on this.

Conclusion

SCI is a lifelong chronic disease and can be accompanied by multiple comorbidities. An integrative approach

to patient care is essential; physiatrists should provide not only acute care of SCIs and complications but also the assessment of comorbidities through adequate diagnosis/treatment/prevention and accurate information. We can reach different results by examining the effects of comorbid conditions according to age groups in a broader patient group of SCIs.

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