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Original Research Paper

EPIDEMIOLOGY OF TRAUMATIC SPINAL CORD INJURY IN SALAH-ALDEEN PROVINCE- IRAQ

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ABSTRACT:

Introduction: Spinal cord injury is expected to be highly prevalent in Iraq because of the exceptional situation of successive wars and violence in the last decades. Additionally, the rate of road traffic accidents, a leading cause of spinal injuries, is supposed also to be high due to the lack of transport safety regulations in the country. However, there is no national spinal cord injury registry currently and the epidemiological data about this problem in Iraq is scarce. The objective of this study is to investigate the epidemiology of traumatic spinal cord injury among patients admitted to Medical Rehabilitation Hospital (formerly Dijlah rehabilitation hospital) in Tikrit city/Salah-Aldeen province-Iraq. The obtained results may be helpful to establish a database for spinal injuries in this region that might be compiled later with data from other areas at the national level, and to plan for solid-base strategies of prevention and management of this devastating condition. **Methods:** A cross sectional study was carried out over a period of one year (January-December 2019) in Medical Rehabilitation Hospital Tikrit city, Salah-Aldeen province/Iraq. The epidemiological profiles and clinical characteristics of one hundred forty two (128 male and 14 females) traumatic spinal cord injured patients were investigated. **Results:** The male/female ratio was (9.14:1). The mean age at injury was (32.2±15.3), with the higher occurrence in the (21-30 year) age group. Etiologically, the leading cause was war injury occurring in (66.19%), followed by road traffic accidents (16.90%), falls (14.08%) and sport injuries (2.81%). The injury was cervical in (17.60%), dorsal in (58.45%), lumbar in (21.83%) and sacral in (2.11%). Complete injury was reported in (71.83%) and incomplete in (28.16%). **Conclusions**: This study highlights the high percentage of war injuries in Iraq that necessitate the development of firm regulations of firearms sale, transfer, possession, and use outside the framework of the government to protect the lives and health of citizens. Political and health authorities have to set regulations and means of decreasing the preventable causes of spinal injuries, like road safety regulations and means of prevention of diving-induced SCI, in addition to raising the public awareness about this condition. Further epidemiological studies in other parts of Iraq is recommended to obtain a full country profile of spinal cord injury that may set a base for any plan of prevention and management of this devastating illness.

Keywords: Iraq; Spinal cord injury; Traumatic; Epidemiology

INTRODUCTION:

Spinal cord injury (SCI) is a tragic condition that causes different degrees of dysfunction in the muscular, sensory or autonomic functions of the body below the level of the injury, resulting in an enormous negative impact at the financial, social and personal levels, leading to a great strain on the health system. It is associated with high rates of mortality and disability and with a wide spectrum of long-term secondary medical complications (1). Etiologically, up to 90% of SCI is traumatic, with transport (mainly road traffic accidents "RTA"), falls and violence being the three most common causes. The

annual incidence of traumatic spinal cord injury (TSCI) is widely variable across the world ranging between 13 to 53 cases/million popu1ation (1). However, most available data about the epidemiology of SCI are coming from the developed countries, little information are reported from the developing countries where more than 80% of the world's population lives (2). As there is no cure for SCI, primary prevention is of paramount importance. Studying and understanding the epidemiological facts of SCI is essential for planning preventative strategies, cost-effective care, and for anticipation of future SCI service needs. Additionally the differences in regional data of prevalence, incidence, causes and patterns of SCI have important implementations on developing prevention plans at country levels (3). SCI is of special significance in Iraq as it's prevalence and incidence are expected to be exceptionally high due to the extra-ordinary situation of successive wars and violence in the last decades. Additionally, the rate of RTA is expected to be high also due to the lack of transport safety regulations in the country. However, there is no national SCI registry currently and the epidemiological data about SCI in Iraq is limited to a few regional studies such as Al-Rubaye study in 2012 (4). The purpose of this study is to investigate the epidemiology of TSCI among patients admitted to Medical Rehabilitation Hospital in Tikrit. The obtained results may be helpful in setting a baseline data for this region that might be compiled later with data from other areas at the national level, and to plan for solid-base strategies of prevention and treatment of TSCI.

METHODS:

A cross sectional study was carried out over a period of one year (January-December 2019) in Medical Rehabilitation Hospital, Tikrit city, Salah-Aldeen province/Iraq. One hundred forty-two traumatic SCI patients were included. All were injured a year or more before the date of this study and completed the basic rehabilitation course. Patients with non-traumatic causes of SCI and with duration of injury of less than one year were excluded from the study. Patients included were informed about the study, signed an informed consent. Their medical records were reviewed and they were interviewed and clinically examined by a consultant rheumatologist. included patient's demographic characteristics, the cause, and severity of injury and the presence of associated injuries at the time of initial trauma. Patients were clinically examined, the neurological deficits were classified according to the classification system of the American Spinal jury Association (ASIA) (5). Data was collated and analyzed using Statistical Package for the Social Sciences (SPSS version 22) software. Continuous variables are resented as mean ± standard deviation, whereas categorical variables are presented as frequencies.

RESULTS:

One hundred forty-two patients were included in this study, (128) male and (14) female, the male/female ratio being (9.14:1). The mean age at the time of injury was (32.2±15.3 yrs) (29.7±14.5 yrs for males and 33.2±16.7yrs for females), with the higher occurrence in the (21-30 yrs) followed by (31-40 yrs) age group. One hundred seventeen patients (82.39%) were paraplegics and (25) were tetraplegics (17.60%). Urban residents constitute 47.88% of the study group (68 patient), whereas 52.11% of patients were living in rural areas (74 patients) (Table 1).

Table 1: Patient's demographics and characteristics

Variable		No.	Frequency
Age	10-20	24	16.90
	21-30	54	38.02
	31-40	49	34.50
	> 40	15	10.56
Gender	Male	128	90.14
	Female	14	9.85
Residence	Urban	68	47.88
	Rural	74	52.11

Etiologically, the leading cause of SCI in this study was war injury occurring in (66.19%), followed by RTA (16.90%), falls (14.08%) and sport injuries (2.81%). Of the war injured group (94 pt.=66.19%), shelling was the causative agent in 53 patients (56.38% of this group), firearms in 37 (39.36%) and mines in 4

patients (4.25%) (Table 2). Highly significant relationship was found between sport type of injury (diving) and male gender (P<.001), and between diving and RTA cases and cervical level of injury (P<.001 for both causes). Significant relationship was also found between shell/firearm accidents and thoracic level of SCI (P=.041), and between war injury and male gender (P=.039).

Table 2: Causes of injury

Variable			No.	Frequency
Cause of injury	**War injury**	**Shell=53pt Firearm=37pt Mine=4pt**	**94**	**66.19**
	RTA		24	16.9
	Fall		20	14.08
	Sport injury/ diving		4	2.81

The injury was cervical in (17.60%), dorsal in (58.45%), lumbar in (21.83%) and sacral in (2.11%) of patients. Complete injury was reported in (71.83%) and incomplete in (28.16%) of patients. Sixty-nine patients (48.59%) of the study group had associated injuries. Among these 69 patients, the most common associated injuries were the chest (28.98%), abdomen (24.63%), extremities (20.28%), head (15.94%) and pelvis (10.14%). (Table 3).

Table 3: Level, severity and associated injuries

Variable		No.	Frequency
Level of injury	Cervical	25	17.6
	Dorsal	83	58.45
	Lumbar	31	21.83
	Sacral	3	2.11
Severity of injury	Complete	102	71.83
	Incomplete	40	28.16
Associated injuries	Chest injury	20	28.98
	Abdominal injury	17	24.63
	Extremities	14	20.28
	Head injury	11	15.94
	Pelvic injury	7	10.14

DISCUSSION:

SCI is understudied in Iraq in spite of the expected high prevalence and incidence due to the longstanding insecure environment over the last decades. Epidemiological data about SCI is sparse as there is in no national registry system or any defined documentation scheme for spinal injuries in this country. Consequently, causes of SCI, including preventable ones, are not defined and no plans are implemented to decrease the occurrence of this devastating injury. In this regard, this is the first epidemiological study performed in Salah-Aldeen province/Medical Rehabilitation Hospital in Tikrit, which is one of two main spinal centers in Iraq. The mean age was (32.2) year with the higher occurrence in the (21-30 year) age group, going with the demographic society of Iraq where this age group comprises about (29.7%) of population (6). The study included (128) males and (14) females with SCI, the male to female ratio being (9.14:1), whereas the male/female gender ratio in Iraq is 101/100 (7). This gender SCI ratio is higher than that reported for developing countries (varying from 1.10:1 to 6.69:1) (8) and still higher than that of countries with comparable socioeconomic and cultural background to Iraq, like Jordan (9), where there is limited participation of women in outdoor activities, like car driving, leading to low women's exposure to traumatic accidents. This high ratio could be explained by the insecure violent situation of Iraq in the last years that make this country to have one of the world's highest figures of conflict-related casualties per capita (10), with consequent high incidence of war injuries, presumably affect men

primarily. In congruence with this presumption, a significant statistical relationship (P=.039) was found between war injury, the commonest cause of SCI in this study, and male gender. Similarly, to this (11) study, high male/female ratio (10.1:1) was reported in Afghanistan where the security situation is comparable to that of Iraq, and in Saudi Arabia (12) where the cultural background are similar to Iraq but with more restrictions of women outdoor activities like car driving. In contrary to the international data of RTA and falls being the leading etiological causes of SCI (1), the picture is reversed in the current study where war injury is the main cause (occurring in 66.19%), followed by RTA and then by falls (reported in "16.90%" and "14.08%" respectively). The high percentage of war injuries (66.19%) in this study reflects the tragic insecure situation and the impact of successive wars in the last decades in Iraq, pushing this type of trauma to the top of the list of TSCI causes. This is an unusual finding all over the World, except that reported by Deconinck in 2001 (59%) in Afghanistan (11) where war and violence incidents are evident as in Iraq. Sport injury was the cause of SCI in four patients (2.81%), all were male tetraplegics and injured due to diving into the shallow water parts of Dijlah River. This might be considered as an exceptionally high figure when taking into account the scarcity of sport activities in Salah-Aldeen province, and is an alarming sign to the local political and health authorities for setting strategies to stop this completely preventable cause of SCI. In the present study, the incidence of SCI among rural (74 patient) and urban (68 patients) dwellers was comparable. This goes in contradiction to many other studies that have reported higher rates of SCI among people living in rural areas (13-16). The figure of urban resident SCI cases might be considered exceptionally high as Salah-Aldeen province is one of the most rural governorates in Iraq, where urban population comprises (48.3%) only (17). A probable cause is the occurrence of violent attacks and RTAs (the major two causes of SCI in this study), widely in the main cities rather than in the rural side in Salah-Aldeen province. The neurological levels of SCI were thoracic (58.45%), lumbar (21.83%), cervical (17.60%) and sacral (2.11%). Complete spinal injuries were more evident with thoracic level SCI. The prevalence of thoracic spinal injury in this study is relatively high compared to the global figures ranging from 18.3% in Estonia to 68.2% in Jordan (18). This variation at country levels could be explained by the etiological variability of SCI. War injuries, the prime cause of spinal injury in this study, frequently involving the thoracolumbar region, might be one of the factors behind the high percentage of thoracic level injury in our study group. This finding is supported by the presence of statically significant relationship between shell/firearm accidents and thoracic level of SCI (P=.041) in this study. Moreover, the high prevalence of war injuries at the thoracic level in the current study might be an explanation of the high ratio of complete (71.83%) compared to incomplete injuries (28.16%). Complete spinal injuries were reported to occur in the range of (25.2%) to (89.96 %) of TSCI patients in Asian countries (19). It was not practical to investigate the annual incidence and prevalence of SCI in the current study as admission to Tikrit hospital is not limited to the citizens of Salah-Aldeen province, but includes those from different northern governorates. Additionally, many patients of Salah-Aldeen and the neighboring provinces prefer to be treated in the capital Baghdad/lbn-Alquff SCI center for different reasons including security issues and the availability of advanced specialties and capabilities. There may be also many missed cases that were not investigated in this study, like patients living in far rural areas for whom the hospital services are inaccessible for different reasons. Moreover, we did not count patients who died at the site of injury, before hospitalization or soon after it, a number that was estimated to be as much as 20% of SCI cases in the United States and Europe (20). Recently injured cases, with less than one year since the date of injury, also were not included in this study. Accordingly, estimating incidence and prevalence of SCI was not of the aims of his study that included patients admitted for any reason and duration of injury and not committed to new cases only. Further nationwide epidemiological studies recommended to investigate the incidence and prevalence of SCI in Iraq for better understanding of the scope of this condition and to set strategies for prevention and plans of management at the country level. This study highlights the high percentage of war injuries that necessitate the development of firm regulations of firearms sale, transfer, possession, and use outside the framework of the government to protect the lives and health of

citizens. It is recommended that political and health authorities have to set regulations and means of decreasing the preventable causes of SCI, like road safety regulations and means of prevention of diving-induced SCI, in addition to raising the public awareness about this devastating condition.

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