

## ORIGINAL ARTICLE

**EXCRETORY DYSFUNCTION AND ITS ASSOCIATION WITH PSYCHOLOGICAL DISTRESS AFTER SPINAL CORD INJURY**Tayyab Awan<sup>1</sup>, Tanveer Kakar<sup>1</sup>, Shafiq Ur Rehman<sup>1</sup>, Saba Khan<sup>1</sup>, Subhan Ur Rehman Burki<sup>1</sup>, Raees Mufti<sup>1</sup>**ABSTRACT**

**Introduction:** Spinal cord injury (SCI) is a medically complex and life-disrupting condition and has been associated with a very high mortality rate. The present study aims to determine the excretory dysfunction in SCI patients and further to find out whether the psychological distress is directly associated with SCI or excretory dysfunction.

**Material & Methods:** A cross-sectional study was conducted over 6 months and the participants were selected using non-probability convenience sampling. The data from 121 spinal cord injury patients were collected using questionnaires, including the Neurogenic Bowel Dysfunction Score Questionnaire (NBDS), Neurogenic Bladder Symptom Score-Short Form (NBSS-SF), Depression Anxiety Stress Scales-21 (DASS-21). Data were analysed using Statistical Package for Social Sciences (SPSS) version 27. Categorical variables were obtained in the form of frequencies and percentages. Mean was obtained and data were presented in the form of tables. The Chi-square test was used to obtain the p-value.

**Results:** A total 121 patients, male (n = 76) and female (n = 45) were recruited in this study. The present study revealed that psychological distress has no association with spinal cord injury (Stress P=0.550, Anxiety P=0.721 and Depression P=0.323). Also, there is no association between psychological distress and neurogenic bowel dysfunction (Stress P=0.969, Anxiety P=0.112 and Depression P=0.751). Although, dramatically in neurogenic bladder dysfunction clinically stress was present but not theoretically (P= .107). However, we found that anxiety (P=.013\*\*) and depression (P=.014\*\*) were strongly associated with neurogenic bladder dysfunction.

**Conclusion:** The study findings showed that psychological distress had no link with Spinal cord injury patients. However, neurogenic bladder dysfunction after spinal cord injury in patients is strongly associated with psychological distress.

**Key Words:** Anxiety, Depression, Neurogenic Bowel, Psychological, Stress, Spinal Cord Injuries, Urinary Bladder

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**INTRODUCTION**

Spinal cord injuries (SCIs) are caused by trauma, inflammation, tumours, or other causes that affect the structure and functions of the spinal cord, resulting in varying degrees of disability, such as paralysis, tetraplegia, muscular dystrophy etc.<sup>1</sup> Spinal cord injury

leads to changes in sensory and motor function that are immediate and, in general, permanent, depending on the degree and extent of the injury. The spinal cord is composed of tissues and nerves that relay signals from the brain and send them to the rest of the body. Nerves may

be directly injured or their surrounding bones and tissues can be damaged, resulting in a spinal cord injury.<sup>2</sup> Since the 1970s, accidents involving motor vehicles and falls have been increasingly common sources of SCI injuries.<sup>3</sup> Globally, according to the findings of a 2010 study, SCI incidence ranges from 13.1 to 52.2 per million people.<sup>4</sup> There has been a wide variation in TSCI incidence in Asia in 2012, ranging from 12.06 per million to 61.6 per million. It is estimated that there are approximately 54 spinal cord injuries (SCI) per million citizens in the United States each year, resulting in about 17,730 new cases every year.<sup>5</sup> Majority of spinal cord injuries (SCIs) are brought on by falls.<sup>6</sup> A loss of balance and a hazardous environment are two of the most common reasons for falls.<sup>7</sup> There are significant societal and individual costs associated with falls. Healthcare systems spend billions of dollars each year on injuries related to falls, including fractures and head injuries.<sup>6</sup> The field of regenerative medicine has investigated a variety of methods over the past few decades, but no effective treatment has yet been developed.<sup>8</sup>

Spinal cord injury is a multi-pathological condition that sustains several other disease conditions in later stage including paralysis, muscular dystrophy, tetraplegia, reduction in supraspinal sympathetic control, psychological distress and excretory dysfunction. Excretory dysfunction is a very troubling condition in which the patient is unable to remove the waste products from urination and stool or feces. Recent studies have demonstrated that it might hamper social participation, resulting in re-admissions and generally adversely affect the quality of life.<sup>9</sup> Most individuals with spinal cord injury (SCI) suffer from neurogenic bladder and bowel dysfunction.<sup>10</sup> According to the definition of psychological distress, it is a particular relationship between the individual and his or her surroundings, one that is evaluated by the individual as "taxing and exceeding his or her resources and posing an immediate threat to the individual's wellbeing". The way a person perceives a situation will determine his reaction, so the way he/she views it, can have a significant effect on how he reacts. Depending on the type of event and the level of sensitivity involved, people react differently. Individuals suffering from psychological discomfort are likely to react differently.<sup>11</sup> Recent studies show that SCI or

any other traumatic injury leads to psychological distress in result that adversely affect the person life and also affect the interaction with family members and society. After Spinal cord injury and excretory dysfunction relatively high rate of anxiety, depression and post-traumatic stress disorder was reported in studies.

The present study aims to determine the excretory dysfunction in SCI patients and further to find out whether psychological distress is probable associated with SCI or may be due excretory dysfunction after spinal cord injury in patients.

## **MATERIAL AND METHODS**

This was an observational cross-sectional study conducted at Paraplegic Centre Hayatabad Peshawar, from December 2021 and May 2022. The patients (n=121) were included in the present study based on inclusion criteria (Traumatic i.e., Road traffic accidents (RTA), falls, Gunshot) and Non-traumatic i.e., tumour, cancer spinal cord injury). The data was collected after approval from the ethical committee of the Northwest Institute of Health Sciences, Peshawar, Pakistan, and the declaration of Helsinki was followed.

The data were collected through specified questionnaires such as Neurogenic Bladder Symptom Score–Short form (NBSS-SF) used for neurogenic bladder dysfunction, Neurogenic bowel dysfunction Score Questionnaire (NBDS) used for neurogenic bowel dysfunction and Depression Anxiety Stress Scales-21 (DASS-21) used for psychological distress. Targeted sample size was 121 calculated by open Epi calculator with a 95% confidence interval. In previous studies, it was found that the prevalence of psychological distress among individuals with excretory dysfunction was 40%, while among those without excretory dysfunction, it was 20%. We used a non-Probability convenience sampling to recruit the participants. Known cases of Congenital dysfunction i.e., myelomeningocele, Complete spinal cord injury, disturbance of consciousness and unstable Vital signs were excluded. The participants who met the inclusion criteria were selected and informed consent was obtained. The purpose of the study was explained to all the participants who agreed to participate in the study. All the participants were given the questionnaire both in English version and those who didn't understand English were given the

Urdu translated version (translated by faculty members of the English department, University of Peshawar, Pakistan) of the questionnaire. For those participants who cannot understand the questionnaire, the questions were verbally asked, in case of difficulty, the investigator helped in filling the questionnaire.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 27. Categorical variables were obtained in the form of frequencies and percentages. Mean was obtained and data were presented in the form of tables. The Chi-square test was used to obtain the p-value. P-value less than 0.05 was considered statistically significant.

## RESULTS

### Demographic data:

The demographic data show that out of 121 patients (n = 76), 62.8% were male (n = 45), and 37.2% were female, as shown in Table 1. In the total 121 patients, the mean age of patients was 35 years. The details of other demographic information are shown in Table 1

### Patients with Psychological distress

As shown in Table 2, The patients with psychological distress are divided into three different forms i-e stress, anxiety, and depression. The patients with no stress were 5 (4.1%), mild patients were 9 (7.4%) and moderate patients were 27 (22.3%), severe was 63 (52.1%) and extremely severe were 17 (14%).

The patients with having no anxiety were 10 (8.3%), mild patients were 8 (6.6%) and moderate patients were 10 (8.3%), severe were 12 (9.9%) and extremely severe were 81 (66.9%).

The patients with no depression were 4 (3.3%), mild patients were 6 (5%) and moderate patients were 22 (18.2%), severe was 38 (31.4%) and extremely severe was 51 (42.1%). The patients with neurogenic bowel dysfunction with very minor symptoms were just 1 (0.8%), minor patients were 8 (6.6%), moderate patients were 20 (16.5%) and severe was 92 (76%).

As shown in Table 3, the neurogenic bladder symptom score-short form (NBSS-SF) 0-28 in which 0 is best and 28 is worst. The ranges from 0-6 normal were 0, from 7-13 mild were 49 (40.5%), from 14-20 moderate were 72 (59.5%) and 21-28 severe were 0.

As shown in Table 4, the level of spinal cord injury and neurogenic bowel dysfunction has no association with stress, Anxiety, and

depression. However, dramatically the neurogenic bladder dysfunction has a strong association with Anxiety and depression, but no association with stress. The P value less than 0.05 were considered statistically significant.

## DISCUSSION

The main aim of our study was to check the excretory dysfunction in SCI and to find out the link between psychological distress with SCI directly or through excretory dysfunction. In the previous study, was conducted in China in 2022. The patients with the thoracic level of injury in our and the previous study were high.<sup>9</sup> This study concluded that spinal cord injury leads to bladder dysfunction which was 121/121 (100%). A study conducted in China Kun Li in 2022, revealed that the bladder accident was 74/101 (73.3%)<sup>9</sup> The mark difference in stress level is because the several factors contribute to elevate the stress level in patients of SCI in Pakistani population. The factors included low income, poverty, effects of war and terror in the locality. In our studies the stress ranges from normal to extremely severe and the highest percentage is severe, which is 52.1%. Study conducted by Migliorini et al in 2008 in Australia and New Zealand population, nearly half of the patients with stress level was 25%.<sup>12</sup>

The anxiety in our studies was from normal to extremely severe with extremely severe having the highest percentage of 66.9%, but a previous study by Wiseman et al 2015 found that the anxiety in the traumatic injury patients was 58.7% which was also extreme<sup>13</sup> In our studies, patients with neurogenic bowel dysfunction were from very minor to severe in which very minor was 1 (0.8%) and severe was 92 (76%). A study conducted in China Kun Li in 2022, the neurogenic bowel dysfunction was from very minor to severe in which very minor was 36 (35.6%) and severe was 33 (32.6%).<sup>9</sup> In this study, the level of spinal cord injury has no association with stress, Anxiety, and depression. A similar study was conducted by Shin et al in 2012 in South Korea reported the association of spinal cord injury with psychological distress.<sup>14</sup> This study reflects the environmental factors and socioeconomic factors or maybe other factors such as genetic variation in population. In our studies, psychological distress has an association with neurogenic bladder dysfunction. In a previous study conducted in 2006 by Oh et al, Korea psychological distress has also been associated

with neurogenic bladder dysfunction.<sup>15</sup> The previous study expanded on neurogenic bowel dysfunction symptoms in patients with spinal cord injuries. The disorder of bowel incontinence in a spinal cord injured patient has a direct association with neurological factors related to the injury and factors related to immobilization of lifestyle, our studies also showed that bowel dysfunction is directly related to neurologic dysfunction and have no association with depression.<sup>16</sup>

The neurogenic bowel dysfunction has no association with stress, anxiety, and depression. The P value less than 0.05 were considered statistically significant. Interestingly, we found a dramatic results here that the neurogenic bladder dysfunction has association with Anxiety ( $P=.013^{**}$ ) and depression ( $P=.014^{**}$ ) however, we found no association with stress ( $P=.107$ ). According to Cronbach's alpha, the internal consistency of the NBD score for the test and retest was moderate to low (0.56 for the test, 0.30 for the retest).<sup>17</sup> Our study shows that there is no association between psychological distress (stress, anxiety, and depression) and spinal cord injury, and no association between psychological distress and bowel dysfunction, but there was an association between bladder dysfunction, anxiety, and depression but not stress.

The study's cross-sectional design limits our ability to establish a causal relationship between excretory dysfunction and psychological distress. A longitudinal study would provide better insights into the cause-and-effect relationship over time.

## CONCLUSION

The present study concluded that there are no symptoms or association of psychological distress with SCI and excretory dysfunction directly. However, we found a dramatically strong association of psychological distress (anxiety and depression) with neurogenic bladder dysfunction and there was no association of psychological distress with SCI and Neurogenic bowel dysfunction.

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Table 1: Demographic characteristics (n=121)

Sex	Age (years)	Marital status	Body mass index	Employment	Education	SCI etiology	Level of injury	Type of injury
Male 76 (62.8%)	18-30 45 (37.2%)	Single 37 (30.6%)	<18.5 6 (5%)	Employed: 63 (52.1%)	Illiterate 47 (38.8%)	Traumatic 82 (67.8%)	Cervical 25(20.7%)	Paraplegic 96 (79.3%)
Female 45 (37.2%)	31-40 32 (26.4%)	Married 84 (69.4%)	18.5- 24.9 77 (63.6%)	Unemployed: 58 (47.9%)	10 <sup>th</sup> standard 42 (34.7%)	Non-Traumatic 39 (32.2%)	Thoracic 57(47.1%)	Tetraplegic 25 (20.7%)
	41-50 44 (36.4%)		25-29.9 33 (27.3%)		12 <sup>th</sup> standard 20 (16.5%)		Lumbar 34(28.1%)	
			30-34.9 5 (4.1%)		Graduate 9 (7.4%)		Sacral 5 (4.1%)	
					Postgraduate 3 (2.5%)			

Table 2: Patients with stress, anxiety, and depression

		Frequency	Percent
Stress	Valid		
	Normal	5	4.1
	Mild	9	7.4
	Moderate	27	22.3
	Severe	63	52.1
Anxiety	extremely severe	17	14.0
	Normal	10	8.3
	Mild	8	6.6
	Moderate	10	8.3
	Severe	12	9.9
Depression	extremely severe	81	66.9
	Normal	4	3.3
	Mild	6	5.0
	Moderate	22	18.2
	Severe	38	31.4
	Extremely severe	51	42.1

Table 3: Patient with neurogenic bladder dysfunction

Ranges	Mild	Moderate
	49 (40.5%)	72 (59.5%)

Table 4: Psychological distress association with SCI, Neurogenic Bowel Dysfunction and Neurogenic Bladder Dysfunction

Spinal Cord Injury	Neurogenic Bowel Dysfunction			Neurogenic Bladder Dysfunction					
	Stress	Anxiety	Depression	Stress	Anxiety	Depression			
P-Value	.550	.721	.323	.969	.112	.751	.107	.013**	.014**

The \* represents 0.05 and \*\* represent 0.01; P value 0.05 was considered statistically significant.