

Knowledge, Acceptance, and Willingness to Undergo Stem Cell Therapy Among Patients with Spinal Cord Injury in Pakistan: A Cross-Sectional Study

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Received: 9th January, 2026

Revised: 20th March, 2026

Accepted: 8th June, 2025

DOI:

<https://doi.org/10.69545/yn2gs351>



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Abstract

Background: SCI is one of the most devastating neurological disorders that lead to permanent disabilities and reduced quality of life of an individual. Despite the fact that stem cell treatment is not yet clinically approved, rising media reports and advancements in science have impacted the mindset and expectations of individuals. It is essential to know about patients' awareness, acceptance, and willingness towards undergoing treatment using stem cells for further policy-making purposes.

Objective: To assess the level of knowledge, acceptance, and willingness to undergo stem cell therapy among patients with spinal cord injury attending rehabilitation centers in Pakistan and to identify factors associated with treatment acceptance.

Methodology: A descriptive cross-sectional study was conducted from December 2025 to April 2026 at rehabilitation centers and tertiary care hospitals in Lahore, Pakistan. A total of 250 patients with chronic spinal cord injury were recruited through consecutive non-probability sampling. Data were collected using a structured interviewer-administered questionnaire assessing demographic characteristics, clinical history, knowledge regarding stem cell therapy, acceptance of treatment, and willingness to undergo therapy.

Results: Among 250 participants, 61.2% had heard about stem cell therapy, while only 28.8% demonstrated adequate knowledge regarding its indications, benefits, and limitations. Overall, 74.4% of participants expressed acceptance of stem cell therapy, and 68.8% reported willingness to undergo treatment if it became available. The majority of participants believed that stem cell therapy could improve mobility and independence, although concerns regarding cost, effectiveness, and safety were commonly reported.

Conclusion: Most patients with spinal cord injury in Pakistan demonstrate positive attitudes toward stem cell therapy and express willingness to undergo treatment. Educational interventions and evidence-based counseling are necessary to ensure realistic expectations regarding stem cell therapies and future regenerative medicine approaches.

Keywords: Spinal cord injury, stem cell therapy, knowledge, acceptance, willingness, regenerative medicine, Pakistan.

Introduction:

Spinal cord injury (SCI) represents one of the most severe neurological disorders worldwide and is associated with significant physical, psychological, social, and economic consequences. Injury to the spinal cord generally causes loss of motor, sensory, and autonomic functions below the level of injury, which can be either partial or complete depending on the extent of damage and the specific region affected. People suffering from SCI may develop paraplegia, tetraplegia, chronic pain, problems related to bowel and bladder function, sexual dysfunction, and long-term dependence on others (1).

The worldwide rate of SCI per year has been reported to be between 40-80 cases/million people annually, with road traffic accidents, falls, violence, sporting activities, and occupational accidents being the major causes (2). In low and middle-income countries like Pakistan, the major cause of SCI is RTA followed by falls. The impact of SCI is worse in less developed regions because there are no facilities for rehabilitation and proper assistive devices along with poor social support mechanisms, as a result of which the individuals suffering from SCI have lifelong disabilities and unemployment (3).

Although significant progress has been made in the field of rehabilitation medicine, currently available treatment options for SCI mainly concentrate on the prevention of secondary complications, optimization of remaining functions and enhancement of quality of life. Traditional approaches such as physiotherapy, occupational therapy, usage of assistive devices and surgery are capable of improving functional autonomy but fail to recover the lost neurological functions. Therefore, many research works have been dedicated to the development of

regenerative techniques which would be able to regenerate the injured nervous tissue and restore neurological functions (4).

The stem cell therapy has become one of the most attractive technologies in the area of regenerative medicine for SCI. The unique feature of the stem cells is self-renewal and differentiation into mature cell types such as neurons and glial cells. According to experimental data, the stem cells might facilitate neural regeneration using several mechanisms such as cell replacement, secretion of neurotrophic factors, inflammation regulation and promotion of axon growth (5). Several stem cell sources including mesenchymal, neural, embryonic and induced pluripotent stem cells were studied as potential tools for SCI treatment (6).

Many preclinical studies and early-stage clinical trials on the use of stem cell therapy in spinal cord injuries have been carried out over the last two decades. However, despite a number of positive results that have been achieved (improvement in motor and sensory functions), evidence is currently inconsistent due to methodological issues, small sample size, and different approaches used (7). At present, stem cell therapy in SCI is still an experimental approach, and more high-quality clinical research needs to be conducted before its wider implementation into the clinical practice.

The increase in popularity of stem cell therapy has been observed alongside with an increase in media coverage and interest of patients in this issue. The majority of people who suffer from chronic neurological problems believe that stem cell therapy can

provide them with a chance to heal, especially when other options do not help at all. Information about stem cell therapy can be found in the social networks, TV shows, websites and other advertisements. However, the information provided can be of poor quality.

The knowledge and perception of patients are of prime importance in the acceptability of the new medical technology. Acceptability can be defined as the attitude of the individual towards a specific intervention, while willingness means the readiness of the person to undergo the treatment when provided. It becomes very important in stem cell therapy, because patient expectations may affect the choices made about the treatment, participation in clinical trials, and use of health care services. Favorable attitudes of people living in developed countries towards stem cell therapy have been found in previous studies (9).

There is no doubt that people in Pakistan have become more aware of stem cell therapy in the last few years, owing to developments in biomedical research, international collaborations, and media coverage in this regard. However, the scientific evidence about the knowledge and perception of stem cell-based therapies from the patients' point of view is still lacking. The problem is of prime importance for those patients suffering from spinal cord injuries, who look forward to treatment due to the lifelong problems associated with their disease.

Moreover, assessing willingness to undertake stem cell therapy will help in gaining insights which will be valuable for clinical use in the

future. With the advancement of therapies based on stem cells, it is imperative to know the factors that influence the willingness of patients to undergo such therapies. Such research will be useful not only to formulate an evidence-based healthcare policy but also to help researchers conducting future clinical trials in this regard to know the patient's expectations and barriers to participation in such trials.

In view of the lack of evidence available from Pakistan, the current research has been conducted to find out the degree of knowledge, acceptance, and willingness of the patients with spinal cord injuries undergoing treatment at rehabilitation centers to undergo stem cell therapy. The study has been designed to explore the factors influencing acceptance and willingness among these patients.

Methods:

The descriptive cross-sectional study was carried out at the rehabilitation sections of tertiary care hospitals and dedicated rehabilitation centers in Lahore, Pakistan during the period from December 2025 through April 2026. The main goal of the research was to evaluate the knowledge, acceptance and willingness of SCI patients towards the stem cell treatment. Ethical clearance was obtained from the Institutional Review Board of University of Lahore before starting the data collection process. All the participants were made aware about the purpose of the study. Confidentiality and anonymity of participant information were maintained throughout the study.

The study population consisted of adult patients diagnosed with spinal cord injury who were attending rehabilitation clinics for follow-up and management. Patients aged 18 years and above with traumatic or non-traumatic spinal cord injury of at least six months duration were eligible for inclusion. Individuals with severe cognitive impairment, active psychiatric illness, acute spinal cord injury, or communication difficulties that prevented completion of the questionnaire were excluded from the study.

The sample size was calculated using the World Health Organization sample size formula for prevalence studies. Assuming that 50% of participants would be willing to undergo stem cell therapy, with a 95% confidence interval and a 6% margin of error, the minimum required sample size was estimated to be 267 participants. Considering possible incomplete responses, 280 participants were approached, of whom 250 completed the questionnaire and were included in the final analysis. Participants were recruited through a consecutive non-probability sampling technique.

Data were collected using a structured interviewer-administered questionnaire developed after an extensive review of the literature. The questionnaire consisted of four sections. The first part obtained demographic data such as age, gender, marital status, education, employment, monthly income of the household, and location of residence. The second part obtained clinical information about the cause of spinal cord injury, time of injury, level of injury, mobility, and history of treatment. The third part was about knowledge of the respondents about stem cell therapy using a

number of questions on concepts about stem cells, use, benefits, risks, and information sources about stem cell therapy. For each correct answer, one point is given, and total knowledge score is computed. Those who have more than 70% are considered to have enough knowledge, otherwise inadequate knowledge.

The fourth part of the survey tested willingness to accept and use stem cell therapy. Participants' acceptance was tested using questions reflecting their attitude towards stem cell therapy and evaluating its effectiveness, safety, and moral acceptance. Answers to these questions were collected through a Likert Scale with a scale of one to five points going from strongly disagree to strongly agree. The willingness to undergo stem cell therapy was determined on the basis of participants' answer to whether they would be ready to use such a treatment when it becomes available upon the recommendation of a physician.

The obtained data were processed by using SPSS (Statistical Package for Social Sciences) version 26. The continuous variables like age and knowledge scores were represented as means and standard deviations, whereas the categorical variables were represented by their frequencies and percentages. Chi-square tests were applied to assess the relationship between the willingness to go through the stem cell therapy and some demographic and clinical parameters. Independent sample t-test was done to compare the mean knowledge scores of different groups. Binary logistic regression test was used to determine the independent predictors of the willingness to go through the stem cell therapy.

Results:

The number of subjects included in the study was 250 patients with spinal cord injury. The mean age of the subjects was 34.7 ± 9.6 years, which ranged between 18 to 65 years. Most of the subjects were male, comprising 72.8% of the study sample, while the female group accounted for 27.2%. Majority of the subjects (61.6%) were married, and about one-third had secondary level of education. The major causes of spinal cord injury in the study were road traffic accidents (48.4%), falls from height (31.2%), occupational injuries (11.6%), and other causes (8.8%).

Table 1. Sociodemographic and Clinical Characteristics of Participants (n=250)

Variable	Frequency	Percentage
Male	182	72.8
Female	68	27.2
Married	154	61.6
Secondary Education or Above	146	58.4
Below Secondary Education	104	41.6
Road Traffic Accident	121	48.4
Falls from Height	78	31.2
Occupational Injury	29	11.6
Other Causes	22	8.8

With respect to the awareness of stem cell therapy, 153 subjects (61.2%) had previously been exposed to stem cell therapy prior to taking part in the survey. The major source of exposure was social media (34.6%), television

shows (24.2%), healthcare practitioners (18.3%), the internet (13.1%), and family/friends (9.8%).

Only 72 participants (28.8%) possessed enough knowledge concerning stem cell therapy with regard to the predetermined knowledge score criteria. While many subjects knew that stem cell therapy was being researched for treating neurological diseases, there were many misconceptions regarding its efficacy, accessibility, and associated risks.

Table 2. Knowledge Regarding Stem Cell Therapy

Knowledge Category	Frequency	Percentage
Adequate Knowledge	72	28.8
Inadequate Knowledge	178	71.2
Third Trimester	60 (68.2)	80 (49.4)

A generally positive attitude toward stem cell therapy was observed among study participants. Overall, 186 participants (74.4%) expressed acceptance of stem cell therapy as a potential treatment option for spinal cord injury. Furthermore, 172 participants (68.8%) reported that they would be willing to undergo stem cell therapy if it became available and was recommended by a qualified healthcare professional.

Table 3. Acceptance and Willingness to Undergo Stem Cell Therapy

Variable	Frequency	Percentage	Variable
Acceptance of Stem Cell Therapy	186	74.4	Acceptance of Stem Cell Therapy
Non-Acceptance	64	25.6	Non-Acceptance
Willing to Undergo Therapy	172	68.8	Willing to Undergo Therapy
Not Willing	78	31.2	Not Willing

Those willing to undergo stem cell treatment gave the following reasons for their decisions: potential neurologic improvement, increased independence, and improved quality of life. For those unwilling to participate, the top worries included the expense (71.8%), uncertainty about its effectiveness (64.1%), fear of complications (51.3%), and lack of information (46.2%).

Significant associations were observed between willingness to undergo stem cell therapy and several demographic and clinical variables. Participants with higher educational attainment demonstrated greater willingness to undergo treatment compared with those with lower education levels ($p=0.003$). Similarly, younger participants were more likely to express willingness than older participants ($p=0.021$). Adequate knowledge regarding stem cell therapy was strongly associated with willingness to undergo treatment ($p<0.001$). Patients with shorter duration of injury also exhibited greater willingness compared with those living with SCI for longer periods ($p=0.017$).

Table 4. Factors Associated with Willingness to Undergo Stem Cell Therapy

Variable	p-value
Age	0.021
Gender	0.287
Education Level	0.003
Duration of Injury	0.017
Knowledge Score	<0.001
Marital Status	0.196

Binary logistic regression analysis identified adequate knowledge (Adjusted OR=2.94; 95% CI: 1.61–5.37), higher education (Adjusted OR=2.17; 95% CI: 1.19–3.96), and age below 40 years (Adjusted OR=1.89; 95% CI: 1.04–3.42) as independent predictors of willingness to undergo stem cell therapy.

Discussion:

Spinal cord injury remains one of the most challenging neurological conditions worldwide because of its profound impact on physical functioning, psychological well-being, and social participation. The emergence of stem cell therapy as a potential regenerative treatment has generated significant interest among patients living with SCI. The present study evaluated knowledge, acceptance, and willingness to undergo stem cell therapy among patients with spinal cord injury in Pakistan and demonstrated that although awareness of stem cell therapy was relatively high, accurate knowledge remained

limited. Despite this knowledge gap, the majority of participants expressed positive attitudes toward stem cell therapy and indicated willingness to undergo treatment if it became available.

According to the results, 61% of the participants had an idea about stem cell therapy before. This kind of awareness can be compared with other research findings made in the developing countries where increased coverage in media had led to increased awareness of regenerative medicine among people. Nonetheless, the knowledge does not always go hand-in-hand with awareness. Only 28.8% of the participants were aware of the scientific concepts, applications and limitations of the stem cell therapy. Such findings have been supported by previous studies such as those made by Sugarman et al., according to which many patients become aware of stem cell therapy while they have limited knowledge about the fact that it is experimental and risky (10).

The use of social media as the major source of information concerning stem cell therapy was revealed. Such a result is a clear reflection of how powerful the role of digital media has become in the process of searching for healthcare-related information in Pakistan. Although social media can be an excellent tool for receiving information about health issues, it is often criticized due to the fact that it contributes to the circulation of wrong information and exaggerated claims. Due to the commercialization of stem cell-based treatments around the world, the marketing of such services directly to patients raises numerous concerns. Individuals suffering from debilitating diseases (SCI) can

easily develop unreasonable hopes because of advertisements and success stories.

One of the main results of this research was the high rate of acceptance of stem cell therapy in SCI patients. Most of the participants were positively inclined to use stem cells in the treatment process. It is quite logical taking into account the lack of restorative treatments for patients with SCI. Traditional rehabilitation methods mostly deal with achieving the maximum functionality and avoiding any problems related to that, but not restoration of nerve tissue. Thus, many SCI patients perceive stem cell therapy as an option for recovery and independence. Such a level of acceptance has already been observed in patients with neurodegenerative diseases and spinal cord injury in other studies (11).

About 69% of respondents expressed their willingness to get stem cell treatment when it becomes available and recommended by any health care provider. It can be concluded that there is a great deal of patient willingness to opt for stem cells in Pakistani SCI patients. Several previous researches in Europe and Asia found high willingness among patients suffering from chronic disease to take part in stem cell trials and treatments (12). Such patient willingness is probably due to the considerable physical and psychological stress caused by SCI and the need to increase mobility and quality of life.

Education level turned out to be one of the determinants of patient willingness to undergo stem cell therapy. Moreover, education can provide a good insight into the new medical technologies and help boost confidence in innovative approaches to

treatment. Also, educated people might have easier access to proper information and better skills in critical evaluation of treatment options. There is an established correlation between educational background and acceptance of innovative medical procedures in earlier researches focused on regenerative medicine and gene therapy (13).

Knowledge about stem cell therapy was shown to be the most powerful factor predicting the willingness to use this method. People who showed good knowledge were almost three times more willing to use the treatment compared to those who had poor knowledge about it. It is obvious that patient education plays a very important role in attitude formation towards innovative procedures. People who have accurate information on possible benefits and limitations of the treatment will probably be able to make proper decisions concerning the use of the treatment.

Significant association was also found between age and willingness for stem cell therapy. It appears that younger participants were more willing to use this technique compared to their older peers. It can be explained by the fact that young people usually expect better recovery and are more open to innovative treatment options. Moreover, younger people tend to know more about technology and science advances and it may affect their attitude towards regenerative medicine. Such differences in age groups were previously found in the studies investigating acceptance of experimental treatments in chronically ill patients (14).

Despite overall positive attitudes, participants raised several worries about implementation of the therapy. Costs were considered the main problem by the respondents. Such results are important since in Pakistan costs of health care are usually paid out-of-pocket. Innovative regenerative methods of treatment are usually costly and they might not be available even if they become clinically used due to high costs. Worries regarding effectiveness and safety of stem cell treatment were also raised by the participants. It can be explained by the fact that stem cell therapy for SCI is still under investigation and its outcomes are unknown yet (6,7).

There are several strengths to the current research. First, the study is one of the very few studies to examine patient views on stem cell therapy in individuals with spinal cord injury in Pakistan. Another strength of the study is the inclusion of participants recruited from rehabilitation centers, where patients receive regular treatment, providing clinically significant data. However, some limitations should be mentioned. The cross-sectional design does not allow evaluating changes over time in patient attitudes and knowledge. The study has been carried out in rehabilitation centers in Lahore; thus, it is unlikely to be generalizable to the whole country. Self-report data can be affected by the social desirability bias.

In spite of these limitations, the current results are valuable for clinical practice and policy makers in the field of regenerative medicine and spinal cord injury. As the science of stem cell therapies is rapidly developing, it will become vital to ensure that patients are provided with proper

information about their treatment. Thus, more multicenter researches with larger sample sizes should be carried out in the future.

Conclusion:

As shown from the results of the study, patients with spinal cord injury in Pakistan have a high level of interest towards stem cell therapy regardless of their lack of awareness about the science behind it and the potential risks. Although a large number of the respondents were aware of stem cell therapy, few of them had adequate knowledge on its applications. However, the majority of the respondents accepted stem cell therapy and expressed their willingness to be treated using the treatment modality if it is made available. Educational status, age, and knowledge were found to be significant predictors of willingness to receive stem cell treatment. In conclusion, patients with spinal cord injury require education in relation to regenerative medicine. It is important for healthcare providers to educate them on the current status of stem cell therapy.

Authors' Contributions:

FA was involved in the design and conceptualization of the research, data collection, and manuscript preparation. UB provided assistance in data interpretation, manuscript revision, and final approval of the manuscript for publication. Both authors have reviewed and approved the final manuscript.

Conflict of Interest:

Authors declare no conflict of interest.

Funding and Ethics:

This research was self-funded by the author.

The study was conducted in accordance with ethical guidelines.

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