Author Year Country Research Design Score Total Sample Size	Methods	Outcomes
	Acute SCI (<1 year)	
Khurana et al. (2017); India RCT <u>PEDro=8</u> Level 1 N=30	<ul> <li>Population: 30 participants with traumatic SCI and with the ability to sit unsupported for at least 10 s and had a minimum of active 90° of shoulder flexion; 28 males and 2 females; mean age 29.6 years; level of injury T6 (n=3), T7 (n=5), T8 (n=9), T9 (n=4), T10 (n=3), T11 (n=2), T12 (n=3); AIS A or B; and time since injury &lt; 6 months.</li> <li>Treatment: All the participants received conventional physical therapy sessions; and were randomly allocated to either of 2 groups which consisted of balance training interventions, performed for 45 min a day, 5 times a week for 4 weeks, and with a progression of the difficulty level of exercises:</li> <li>Participants in group A (n=15) underwent VR game-based balance training in 3 environments (used to challenge movements and positions of various body segments to train the sitting balance).</li> <li>Participants in group B (n=15) underwent real-world task-specific balance training in an unsupported sitting position.</li> <li>Outcome Measures: mFRT and t-shirt test were assessed at the beginning and at the end of the intervention.</li> </ul>	<ol> <li>Overall, participants who received VR game-based balance training showed better improvement on the mFRT and the t-shirt test as compared to participants who received real-world task-specific balance training.</li> <li>The mFRT scores showed a significant change for time (p=0.001) and Time x Group (p=0.001) but no significant change for group effect (p=0.057).</li> <li>The t-shirt test scores showed a significant change for group effect (p=0.05), but no significant change for time (p=0.14) and Time x Group (p=0.99).</li> </ol>
<u>Goel et al. (2023);</u> India RCT	<ul> <li>Population: 18 participants with SCI and AIS B, C, or D:</li> <li>VR + CPT Group (n=9): 8M, 1F; mean age: 39.11 years; and mean time since injury: 7.56 months</li> </ul>	1. mFRT: Within-group analysis reported statistically significant improvement (p=0.001) in VR + CPT group as well as
PEDro=6 Level 1 N=18	<ul> <li>FES + CPT Group (n=9): 7M, 2F; mean age: 41.89 years; and mean time since injury: 6.89 months</li> <li>Treatment: Eligible participants were randomized into the VR group and FES</li> </ul>	Between-group analysis revealed that trunk stability was more significantly improved in VR + CPT group as compared to FES + CPT

## Table 3. Virtual Reality (VR) for Sitting Balance

<ul> <li>group; both groups received conventional physical therapy (CPT) treatment as well.</li> <li>Each participant was exposed to 45-min session of VR or FES along with the CPT session of 30 min, conducting five sessions per week for 4 consecutive weeks:</li> <li>VR training: Immersive type of VR, with games focused on trunk movements while the participant was in sitting position.</li> </ul>	2.	group (p=0.003) with a 95% CI of 1.52–6.07. The calculated mean change between both the groups of 4.79 cm was more than the previously established MCID value with a large effect size (1.67), thus indicating clinical improvement. FIST: Statistically
<ul> <li>Functional Electrical Stimulation: FES was used to induce muscle contraction in erector spinae and rectus abdominis in the thoraco-lumbar area, bilaterally on the motor points. Participants were in sitting position with back unsupported and, hands crossed and kept on shoulders or while performing reach outs. Three phases in the FES program used were as follows: first warmup, followed by work phase, and lastly recovery phase in simultaneous mode was used. The pulse frequency for warmup and recovery was set to 3 Hz. Both of these phases last for 5 min. The duration of the work phase was 30 min with a frequency set to 18 Hz. The intensity of the current was individually elevated to a level at which visibly strong contraction is obtained, but he/she having no unpleasant sensation. Muscles were activated simultaneously to generate coactivation and, therefore, to stiffen the trunk.</li> </ul>	3.	significant result has been calculated in VR + CPT group (P=0.01) as well as in FES + CPT group (P=0.01). Between-group analysis revealed significant differences proving VR is a more effective treatment than FES (P=0.002) within the calculated range of -2-13 points. Clinical significance was reported with calculated changes in scores (7 points) being more than MDC of the scale and medium effect size (0.72) for both the groups. SCIM-III: For all domains, there was statistically significant improvement in the VR + CPT group (P=0.01) and the FES + CPT group (P=0.01).
Conventional Physical Therapy consisted of 2 sets of 12 repetitions of each range of motion exercises for both upper and lower limbs and mat exercises like rolling, long sitting and kneeling (2 repetitions with 5 min hold each).	4.	The VR + CPT group had greater improvements than the other group, with a in self-care, mobility, and total scores, P=.006, 0.004, and 0.006 respectively
<b>Outcome Measures:</b> mFRT, function in sitting test (FIST) (both static and dynamic components were evaluated), and SCIM-III were assessed at baseline, 2 and 4 weeks after intervention		but non-significant in respiration and sphincter management with scores ranging from 1 to 19.
	5.	In both groups, no significant difference was noted in terms of the level of independence clinically as median changes in

		6.	total scores (8 points) were less than the established MCID. Side effects: The headset was found to be a little heavy, which was troublesome to some participants. Fear of fall initially after wearing the headgear and starting the game was felt by the participants. No other known harms of side effects were reported in general.
Sengupta et al. (2020); India Prospective control trial Level 2 N=33	<ul> <li>Population: 33 patients with SCI, neurological level of injury C5 or below and ability to abduct both shoulder at &gt;90°; 27 males and 6 females; mean age 29.25 years; level of injury cervical (n=11), upper dorsal (n=10) and lower dorsal (n=12); AIS A (n=10), AIS B (n=8), AIS C (n=8), and AIS D (n=7); and mean time since injury &lt; 6 months.</li> <li>Treatment: Conventional therapy with individualized exercise program was provided to all participants. Additionally, participants were divided in two groups:</li> <li>VR training group (n=25): Participants performed VR training 5 days a week for 3 weeks with sessions lasting 30 min. All the games selected focused on static and dynamic balance and were played either while sitting or standing depending on the functional ability of the participant. The level of difficulty was gradually upgraded based on their performance.</li> <li>Control group (n=12 matched controls).</li> <li>Outcome Measures: BBS, balance section of the Tinetti Performance-Oriented Mobility Assessment (POMA-B), and Functional Reach Score (seated) were assessed pre and post intervention.</li> </ul>	1.	No statistically significant differences between the groups in the scores of pre- and post-therapy were observed.
Chronic SCI (>1 year)			
<u>Nair et al. (2022);</u> India	<b>Population:</b> 21 participants with SCI, the ability to sit unsupported for 30 s, and the	1.	For the mFRT, the within- group analysis showed that both groups showed

RCT PEDro=6	ability to raise their hands to the head without losing balance.	significant difference post the intervention (P<0.05)
Level 1 N=21	<ul> <li>Group A (n=10): Mean (SD) age: 30.1 (8.37) years; 7M, 3F; level of injury: T10- T12 (n=4), L1-L4 (n=6); and mean (SD) time since injury: 2.45 (0.71) years</li> </ul>	On comparison between the two groups, it was seen that Group B
	<ul> <li>Group B (n=11): Mean (SD) age: 32.45</li> <li>(7) years; 6M, 5F; level of injury: TIO-TI2</li> <li>(n=6), L1-L4 (n=5); and mean (SD) time since injury: 2.35 (0.96) years</li> </ul>	improvement in all the reach distances.
	<b>Treatment:</b> Treatment Intervention was set for four weeks. Both groups received their routine therapy (exercise program focusing on strengthening, mobility, postural stability, and skill training) on six days of the week for 45 min. In addition, for three days per week, participants were assigned into one of the two groups:	
	<ul> <li>Group B (n=11): Received 30 min of VR training in the seated position using Xbox Kinect.</li> </ul>	
	<ul> <li>Group A (n=10): Received 30 min of conventional therapy focused on training sitting balance.</li> </ul>	
	<b>Outcome Measures:</b> mFRT and T-shirt test were measured prior and post the intervention	
l ee & l ee (2021):	<b>Population:</b> 20 participants with chronic incomplete paraplegia and with capacity to maintain an independent sitting position for more than 30 s; 13 males and 7 females; mean age 54.4 years; level of injury thoracic (n=21) and lumbar (n=9); AIS C (n=13) and AIS D (n=7); and mean time since injury 25.2 months.	<ol> <li>Both groups showed a statistically significant increase in post- treatment Force Sensitive Application and LOS scores as compared to the pre-treatment scores (p&lt;0.05).</li> </ol>
Korea RCT PEDro=5 Level 2	<b>Treatment:</b> Both groups received general occupational therapy consisting of five 30-min sessions per week for 8 weeks. Participants were randomly allocated to one of two groups:	2. Between-groups comparison showed a statistically significant increase in scores of all assessments in the
N=20	• VR therapy group (n=10): Participants received 30 min of VR balance training on a sitting position with an individualization of the difficulty level.	experimental group as compared to the control group (p<0.05).
	<ul> <li>Control group (n=10): Participants received 30 min of general rehabilitation (comprised for improving sitting balance).</li> </ul>	

	<b>Outcome Measures:</b> Sitting balance ability (measured by Force Sensitive Application) and LOS was assessed pre and post treatment.		
	<b>Population:</b> 11 participants with a SCI lower than TI and have passed the early subacute phase; 7 males and 4 females; mean (± SD) age 42.36 (± 12.90) years; AIS A (n=6), AIS C (n=3) and AIS D (n=2).	1.	No statistically significant differences were found between groups after the intervention in SCIM-III and mFRT.
<u>Manzanares et al.</u> <u>(2021);</u> Spain	<b>Treatment:</b> All participants in both groups performed the hospital rehabilitation protocol consisting of 2h per day of physiotherapeutic exercise, strengthening and mobility work, 5 days a week.	2.	Within group pre-post analyses showed significant improvement for mobility variable of the SCIM (p=0.036) for
RCT <u>PEDro=4</u> Level 2 N=11	In addition, participants were randomly assigned to control (n=5) or experimental (n=6) group. The experimental group underwent semi-immersive VR navigation therapy (virtual sailing in a sitting position) for 30–40 min per day, 3 times per week for 6 weeks.	3.	experimental group Within-group pre-post analyses showed that only the experimental group improved in the mFRT (p=.011).
	<b>Outcome Measures:</b> SCIM-III and mFRT were assessed one week before the start of the experimental phase and one day after the last session.		
	<b>Population:</b> 26 participants with SCI and the ability to sit for more than 30 s independently; 20 males and 6 females; mean age 46.3 years; injury level cervical (n=9) and thoracic (n=17); AIS A (n=20) and AIS B (n=6): mean time since injury 22 0 months	1.	Significant improvements in static balance parameters (anterior- posterior sway distance and velocity; medial- lateral sway distance and
<u>Tak et al. (2015)</u> ; South Korea	<b>Treatment:</b> All participants underwent conventional rehabilitation, consisting of a daily 3-hour physical and occupational therapy session, including stretching, strengthening, and functional training with		velocity; and total sway distance and velocity) were found in patients who received VR training (p<.05).
RCT <u>PEDro=7</u>	sitting balance training, transfer to toilet, and positioning according to an individualized exercise schedule (5 days a week for 6 weeks).	2.	The VR group showed significant improvement compared to the control group only for anterior-
N=26	<ul> <li>Additionally, participants were assigned to either a:</li> <li>VR training (n=13): Patients underwent a 30-min VR training program, using a Nintendo Wii. 7 times a weak for C</li> </ul>		posterior sway distance and velocity (p<0.05), and total sway distance and velocity (p<0.05).
	weeks, while sitting. According to the game selected, the patient may do balance training by using the arms and trunk, and can identify the correct motion through an avatar and feedback on the screen.	3.	Dynamic balance significantly improved in the VR group compared with that in the control group (p<0.05).

• (	Control group (n=13).	4.	The mFRT scores were
<b>Outcom</b> postura were ev	<b>ne Measures:</b> Static balance ability, I sway (PS) distance, and velocity aluated with the participants seated		significantly better for left (25%), front (39%), and right (43%).
on a cha diamete forcepla assessed Assessm beginni	air and asked to stare at the 10-cm er target placed 3 m away (by using a lite); and dynamic balance ability was d using the mFRT and T-shirt test. hents were conducted at the ng and at the end of treatment.	5.	The T-shirt test time after intervention was shorter (23%) than the pre-test time in the VR group.