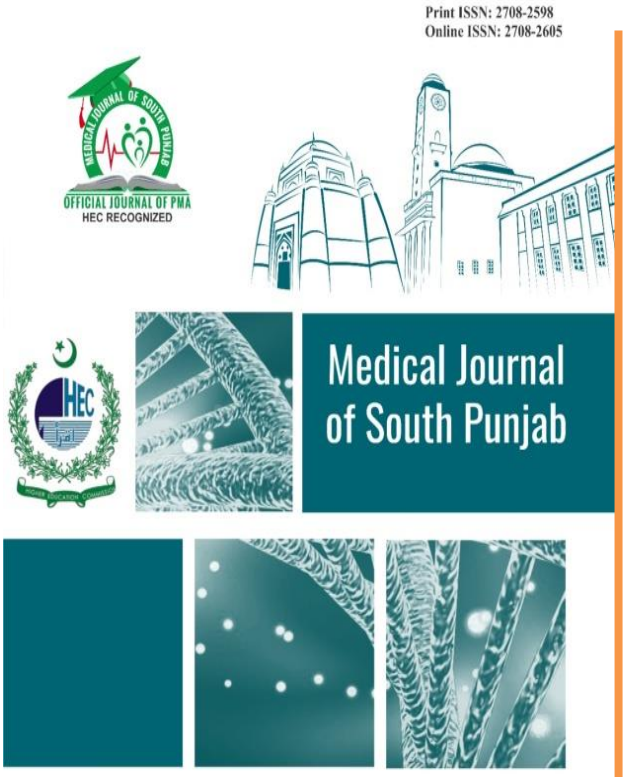
ISSN (E): 2708-2601
ISSN (P): 2708-2598

Medical Journal of South Punjab
Article DOI:10.61581/MJSP.VOL07/03/10
Volume 7, Issue 3, 2026



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Publication History

Received: Sep 01, 2026 Revised: Sept 14, 2026
Accepted: Sep 26, 2026 Published: Sep 30, 2026

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Conflict of Interest:

Author(s) declared no conflict of interest.

Acknowledgment:

No Funding received.

Citation: Shoukat M, Rani A. Comparative analysis of task-oriented strength training and conventional physical therapy to improve activities of daily living in children with spastic cerebral palsy. Medical Journal of South Punjab. 2026 Septemeber 30; 7(3):54-59.

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An official publication of
Medteach Private Limited, Multan, Pakistan.
Email: farman@mjsp.com.pk, Website: https://mjsp.com.pk/index.php/mjsp

Medical Journal of South Punjab
Volume 7, Issue 3, 2026; pp: 54-59
Original Article

Comparative analysis of task-oriented strength training and conventional physical therapy to improve activities of daily living in children with spastic cerebral palsy

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ABSTRACT

Objective: To examine the efectiveneess between task-oriented strength training and conventional physical therapy on improving ADLs in children with spastic diplegic CP.

Methodology: A randomized controlled trial was conducted at Physio Brain, Rahim Yar Khan from 2nd May 2026 to 31st Aug 2026. The age of children were 5-8. Sixty children with GMFCS level II were participated. They were divided in to two groups. Both groups were participate in 45-minutes sessions, three times a week, for six weeks. Group A were given task-oriented strength training, while Group B were given traditional physical therapy. Functionality was measured using the Functional Independence Measure for Children (WeeFIM).

Results: Data was analyzed by SPSS v 27.0 Demographic factors were summarized using descriptive statistics, and the test of normality of data distribution using the Shapiro-Wilk test was performed. The data was not normally distributed; the Wilcoxon signed-rank test and the Mann-Whitney test were used. Data was considered significant if $p<0.01$. Both task-oriented strength training and conventional physiotherapy showed statistically significant within-group changes in self-care, mobility, cognition, and total WeeFIM scores ($p<.001$) for all outcomes). The groups did not differ significantly at baseline ($p=.538$); however, post-intervention total WeeFIM rankings significantly favoured task-oriented strength training (mean rank = 37.75) over conventional physiotherapy (mean rank = 23.25; $p<.001$).

Conclusion: These findings suggest that task-oriented strength training may offer greater benefits for overall functional independence in children with spastic cerebral palsy. However, the magnitude and clinical significance of the difference require further investigation.

Keywords: Cerebral palsy, Spastic diplegic CP, Task-oriented strength training, Conventional physical therapy, Activities of daily living.

1. INTRODUCTION

Cerebral palsy (CP) is a very common childhood physical disability caused by permanent movement and posture disorders due to disturbances in the developing fetal or infant brain.[1] The functional consequences of the underlying brain injuries can vary with age, causing muscle weakness, abnormal muscle tone and motor control abnormalities, and secondary musculoskeletal complications[2, 3]. Approximately 70-80% of all cerebral palsy cases are spastic cerebral palsy which is characterized by high muscle tone, hyperreflexia and a loss of selective motor control[4]. Such impairments can greatly limit children's activity of daily living (ADL) skills such as dressing, feeding, transfers and mobility.[2, 5] Therefore, issues relating to functional limitations can reduce children's independence and their involvement in family, educational, and community activities, thus impacting their overall quality of life[6]. Rehabilitation thus not just focuses on the Physical Impairment and also on enhancing function and independence with measures suitable to children's daily activities.[7]

Traditional PT usually includes strengthening exercises, range-of-motion exercises and stretching to help alleviate muscle tension, preserve joint movement and strengthen the muscles. Improved impairments, however, don't always lead to improved functional abilities. Task orientated strength training looks at strengthening using repetitive, functional, meaningful and goal orientated activities. This method prioritizes specificity of the task, practice, feedback, and active participation, supporting motor learning and transfer of skills to real-world applications[8, 9]. Passengerenger interventions are promising, as have been reported in previous studies. Better functional ability, balance and ADL scores in the task oriented strength training group as compared to the conventional therapy group. In the same way, Mohsen Abd-Elfattah et al. compared functional strength training with other exercise routines and found better gains in lower-limb strength, walking function and balance.[10] Task-specific training in combination with conventional physical therapy has been found to have positive results on gait and functional mobility outcomes.[11] In addition, Task oriented training led to improvements in mobility and capability of carrying out daily functions independently. As a whole this collective information suggests that task specific functional rehabilitation may be of value in children with cerebral palsy.

However, further research is needed to determine the relative effectiveness of task-oriented strength training compared to traditional physical therapy in enhancing ADLs in children with spastic CP in the Pakistani health care environment, given the encouraging evidence. Previous research has examined a wide range of interventions and measures such as gait, balance, muscle strength and gross motor functioning and made comparisons with this limited research is difficult to make direct comparisons between the effects of interventions on functional independence.[12, 13] Standardized measures of daily functioning are important to assess these interventions.[14] Thus, the purpose of this study was to examine the impact of task-oriented strength training and traditional physical therapy on children with spastic cerebral palsy when it comes to activities of daily living (ADL). It was hypothesized that a difference would exist between the two interventions in their effect on ADL performance.

2. METHODOLOGY

A randomized controlled trial was carried out at Physio Brain, Rahim Yar Khan from 2nd May 2026 to 31st Aug 2026. The subjects were the children aged 5–8 years diagnosed with spastic diplegic cerebral palsy (S.DCP) and they were selected through purposive sampling type (non-probability) and later randomly divided into two groups (n=30) without replacement. Included were children with some kind of activity of daily living

(ADL) limitation that were able to follow instructions and were medically stable. Demographic data was collected and a Functional Independence Measure for Children (WeeFIM) was head-surveyed pre- and post-treatment for self-care, mobility and cognitive functioning.[15] The data were analyzed in SPSS version 27.The normality was evaluated by the Shapiro–Wilks test and paired and independent t-tests or Wilcoxon signed rank and Mann Whitney U tests were performed depending on normality or non-normality. A difference was considered statistically significant at $p<0.05$. Ethical approval was obtained from the pertinent committee of TIMES Institute, Multan and informed written consent was taken from parents/legislative guardians. Confidentiality and voluntary participation was respected.Both groups received physiotherapy for 45 minutes, three times weekly, for six weeks. Group A had strength training based on the tasks such as sit to stand, step up, bridging, functional walking and functional transfers to increase strength, balance, coordination and functional independence. Group B was given regular physiotherapy, consisting of the hamstrings, calf and hip flexor stretch, knee range of motion, ankle range of motion, general strengthening exercises (leg lifts, knee extensions and mini-squats), and balance and coordination exercises. Changes in functional independence were compared between the groups and WeeFIM was repeated after the intervention.

3. RESULTS

The pre- and post-intervention comparisons for Group A. Statistically significant differences were observed in self-care, mobility, cognition, and total WeeFIM scores ($p < 0.001$ for all outcomes). For self-care, the reported IQR decreased from 5.5 to 5.3, while mobility maintained an IQR of 2.3 at both assessments.

Table 1: Within-Group Analysis of Group (A)

Variables	Assessment	Pre-intervention, Median (IQR)	Post-intervention, Median (IQR)	P-value
Self-care	Post vs. Pre	5.5	5.3	<0.001
Mobility	Post vs. Pre	2.3	2.3	<0.001
Cognition	Post vs. Pre	4.3	3.5	<0.001
Total WeeFIM	Post vs. Pre	0.00	0.00	<0.001

Cognition showed a decrease in IQR from 4.3 to 3.5, whereas the total WeeFIM graded score had an IQR of zero at both assessments. Based on the total WeeFIM grading system, a score of 4 represents minimal assistance, while a score of 5 represents supervision needed. Therefore, if the pre- and post-intervention medians are 4 and 5, respectively, this indicates an improvement in level of functional independence.

The pre- and post-intervention comparisons for Group B. Statistically significant differences were reported for self-care, mobility, cognition, and total WeeFIM scores ($p < 0.001$ for all outcomes). The IQR for self-care decreased from 6 to 5.75, while mobility increased from 3.75 to 4.

Table 2: Within Group Analysis of Group (B)

Variable	Assessment	Median (IQR) Pre	Median (IQR) Post	P-value
Self-care	Post vs. Pre	6	5.75	<0.001
Mobility	Post vs. Pre	3.75	4.00	<0.001
Cognition	Post vs. Pre	4.00	4.00	<0.001
Total WeeFIM	Post vs. Pre	0.00	1.00	<0.001

Cognition maintained an IQR of 4 at both assessments, whereas the total WeeFIM graded score showed an increase in IQR from zero to 1. According to the grading system, a total score of 4 represents minimal assistance and a score of 5 represents supervision needed. If the reported pre- and post-intervention values represent medians of 4 and 5, the change indicates improved functional status.

Table 3: Between-Group Comparison of Pre-Intervention Total WeeFIM Score

Variable	Assessment	Group	Median (IQR)	P-value
Total WeeFIM Score	Pre-intervention	**Group A – Task-oriented Strength Training**	0.00	0.538
		Group B – Conventional Physiotherapy	0.00	

The baseline comparison of total WeeFIM scores between Group A and Group B using the Mann–Whitney U test. Group A had a mean rank of 31.40, compared with 29.60 for Group B.The difference was not statistically significant (p = 0.538), indicating that there was no statistically significant difference in baseline total WeeFIM scores between the groups. Both groups had a reported median graded score of 4 and an IQR of zero. A graded score of 4 corresponds to minimal assistance according to the study's scoring system.

Group A had a higher mean rank of 37.75, compared with 23.25 for Group B. The difference was statistically significant (p < 0.001), indicating a significant difference in post-intervention functional status between the groups.

Table 4: Between-Group Comparison of Post-Intervention Total WeeFIM Score

Variable	Assessment	Group	Median (IQR)	P-value
Total WeeFIM Score	Post-intervention	**Group A – Task-oriented Strength Training**	0.00	<0.001
		Group B – Conventional Physiotherapy	1.00	

The reported median graded score for Group A was 5, corresponding to supervision needed, with an IQR of zero. Group B had a reported median graded score of 5 and an IQR of 1. Figure 11 illustrates the post-intervention between-group comparison.

The findings revealed pre- and post-intervention differences that were statistically significant for both groups of children receiving the treatment for self-care, mobility, cognition, and for total WeeFIM scores. At baseline, no statistically significant difference was found between the groups with regard to the WeeFIM graded score (p = 0.538). However, between-group difference was found after the intervention (p<0.001) with the mean rank being higher in group A than group B, with group A scoring 4 (minimal assistance) and group B scoring 5 (supervision needed) for the grading system of the study. The results indicate that both interventions are associated with significant improvements in functional outcomes, and that for the ranked total WeeFIM scores, the post intervention comparison favoured task-oriented strength training.

4. DISCUSSION

This study compared task-oriented strength training and traditional physiotherapy in 60 children with spastic diplegic cerebral palsy (CP). Statistically significant pre- and post differences between both groups were found in total WeeFIM, self-care and mobility scores (p < 0.001).Statistically significant pre and post differences were found in self-care, mobility and cognition scores and total WeeFIM scores (p < 0.001) between both groups. The post intervention comparison favoured task oriented strength training with higher mean rank (37.75) than conventional physiotherapy (23.25) (p<0.001).

Self-care: There was a significant difference between both Group A (p < 0.001) and Group B (p < 0.001). This indicates that children have changed their behaviour of each everyday task after each of these interventions.[16] In their Systematic Review, and Meta Analysis, Feng et al. found positive results for task-oriented training in functional performance and in Activities of Daily Living.[17] Task-based training brought better results than that of physiotherapy. Results from the present study, however, do not demonstrate superiority of the self-care, due to a lack of between-group comparison.

Mobility: Statistically significant differences exist between the groups at pre- and post-test ($p < 0.001$). Functional strength training led to increases in lower-limb strength & walking function.[18] Likewise, Zai et al. concluded that task related training provided benefits for gross motor skills and balance.[19] The present study confirms the role of functional exercise in mobility in agreement with the above findings, albeit not specifically for a between group test of superiority.

Cognition: Significant differences occurred in both groups as well ($p < 0.001$). The results should, however, be interpreted with caution as the interventions mainly involved physical intervention. The reported statistics do not confirm that there is any improvement in underlying cognitive skills and additional analysis of the scores for the WeeFIM cognition scores are required.

Baseline scores were not different among the groups ($p = 0.538$) for Total WeeFIM. After treatment, there was a significant between group difference in favour of task oriented strength training ($p < 0.001$). This is similar to the fact that Chughtai et al. reported good functional outcomes after task oriented interventions.[9] Children can learn how to use strength and coordination in purposeful activities to help them gain practice in tasks they encounter in everyday life, including sit-to-stand, stepping and transfers[20]. Overall, both interventions resulted in significant changes; however, the task-oriented strength training resulted in more favourable post-intervention total WeeFIM strengths. However, the clinical relevance of this difference is unclear since effect sizes were not provided. Descriptive data prior to definitive conclusions of the direction and magnitude of improvement should also be assessed.

5. CONCLUSION

Task oriented strength training had better post intervention total WeeFIM scores than the traditional physiotherapy in children with spastic cerebral palsy. These showed significant within-group differences but more work is required to quantify and assess the clinical significance of these differences.

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