



# Effects of R-BoT+plus Gait-assisted Robotic Training in Patients with Subacute Stroke : A Randomized Controlled Trial

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## INTRODUCTION

Stroke-related gait impairment is a major cause of disability, and early recovery during the subacute phase is critical for long-term outcomes. However, patients with severe motor deficits often have difficulty participating in conventional gait training. **Robotic-assisted rehabilitation**, such as the **R-BoT+plus system**, enables **early verticalization (tilting table)** and **repetitive stepping-like movements**. This study evaluated whether **adding R-BoT+plus to conventional rehabilitation improves gait independence in patients with subacute stroke**.



Figure 1. R-BoT+plus system.

## METHOD

This randomized controlled trial included patients with subacute stroke and severe gait impairment ( $FAC \leq 2$ ). Participants were assigned to either **R-BoT+plus combined with conventional rehabilitation** or **conventional rehabilitation alone**. Both groups received therapy **five times per week for four weeks**, and the experimental group additionally underwent **20 sessions of robotic training**. Outcomes were assessed at **baseline** and **post-intervention**, with a **three-month follow-up** for gait independence. The primary outcome was **FAC**, and secondary outcomes included **trunk control (TCT)**, cognition, ADL, balance, and lower-extremity motor function.

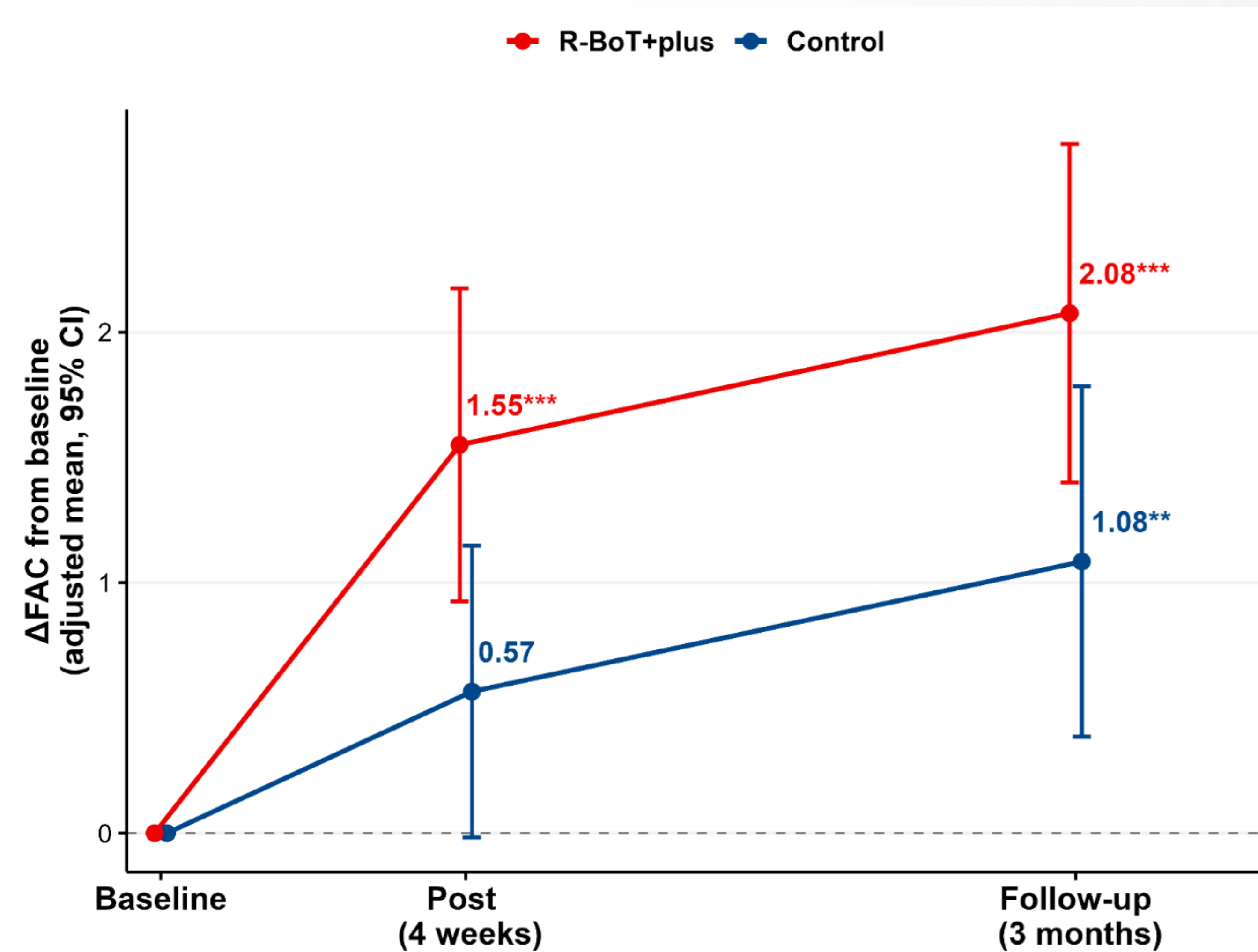


Figure 2. FAC changes over time in the experimental and control groups.

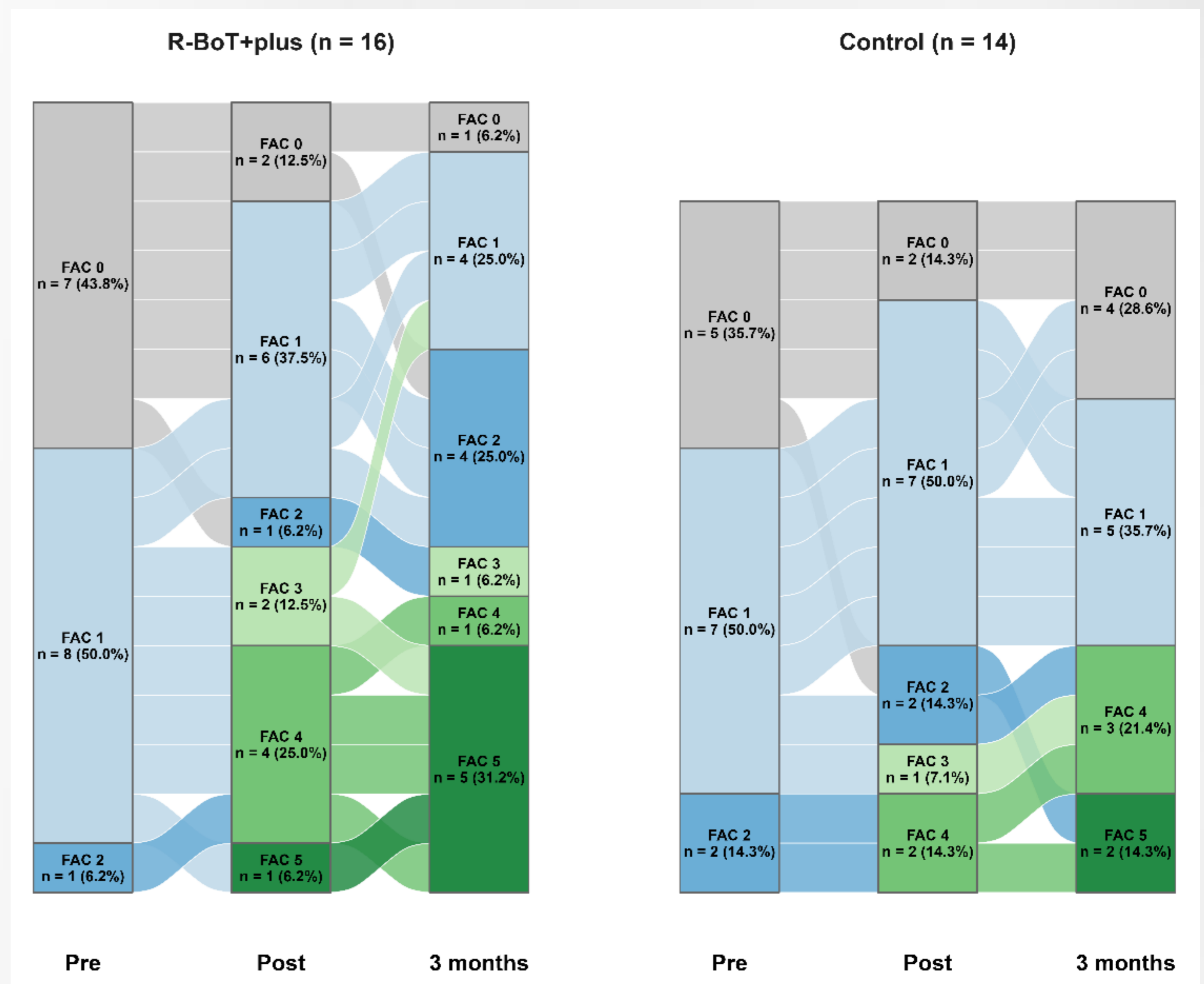


Figure 3. Individual-level transitions in FAC from baseline to post-intervention and 3-month follow-up in the R-BoT+plus and control groups.

## RESULTS

A total of **43 participants** completed the study (20 in the experimental group, 23 in the control group). There were no significant differences in baseline characteristics between the two groups. The experimental group demonstrated significantly **greater improvement in gait independence** compared with the control group, with a **mean FAC change of  $1.55 \pm 1.32$  versus  $0.57 \pm 0.79$  ( $p = 0.010$ )**. This superior improvement was **sustained at the three-month follow-up**, as confirmed by mixed-effects modeling. Baseline-adjusted regression revealed that patients with **lower baseline TCT** experienced **significantly greater improvement in the experimental group**, indicating a **baseline-dependent treatment effect**. Cognitive function, ADL, balance, and lower-extremity motor function improved in both groups; however, there were no significant between-group differences in these secondary outcomes.

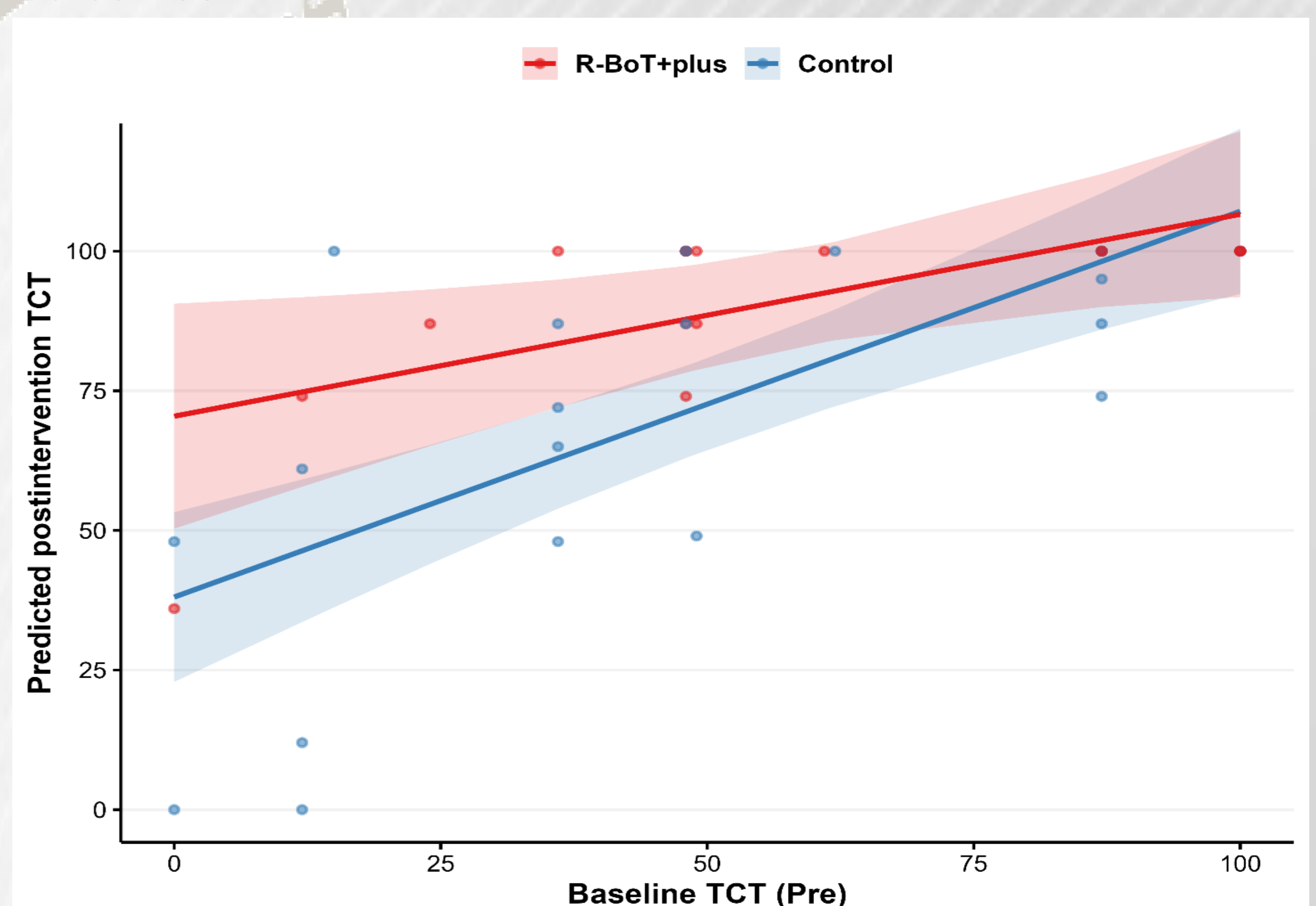


Figure 4. Predicted postintervention TCT score by baseline TCT score in the R-BoT+plus and control groups.

## CONCLUSION

**R-BoT+plus** combined with conventional rehabilitation significantly **improves gait independence** in patients with **subacute stroke**, with **greater benefits** observed in those with **more severe initial impairment**. This approach may be particularly useful for facilitating early ambulation in patients with limited functional capacity.

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