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Do Physical Impairments Shape Gait in Childhood Cancer? Evidence of Compensatory Strategies to Ensure Safe Walking: A Cross-Sectional Correlation Study

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Background & Aims: Safe and unrestricted walking is essential for participation in everyday life. It depends on the balanced contribution of muscle strength and joint mobility, modulated by precise sensory feedback. In children with cancer, physical impairments like reduced strength, limited joint mobility, and balance deficits can disrupt this interplay, and lead to compensatory gait adaptations. However, the relationship between gait and physical performance has not yet been systematically investigated. Therefore, this study aims to examine this relationship in childhood cancer patients. The findings may help identify potential compensatory strategies and support the development of targeted interventions to improve walking ability and reduce fall risk.

Methods: Sixty-four childhood cancer patients and survivors aged 9.75 ± 4.01 years performed gait analysis and physical performance assessments (lower limb strength, joint range of motion, balance, and functional mobility). Performance data were compared with age- and sex-matched normative values using Wilcoxon signed-rank test. Associations between physical performance and gait were analyzed using partial Spearman's rank correlation, adjusted for age, body height and weight. Significance was set at $p < .05$.

Results: Participants showed significant deficits in gait (step length, base of support, walking speed; $p < .001$) and physical performance parameters (lower limb strength, joint mobility, balance, functional mobility; $p < .05$) compared to normative values. Correlation analysis revealed significant associations between strength, joint mobility, balance, functional mobility, and gait parameters ($p < .05$).

Conclusions: Our findings highlight noticeable impairments in gait and physical performance in children and adolescents with cancer. Observed adaptations in gait patterns may reflect compensatory strategies in response to limitations in strength, joint mobility, or balance, but no causal relationships can be inferred. Regular assessments of gait and physical performance may help detect deficits early and guide personalized interventions to support safe ambulation and long-term functional outcomes.

Keywords

Childhood cancer, Gait, Physical impairments, Physical performance assessments

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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