

A comparison between strength, balance, endurance, and coordination in young persons with Down syndrome and typically developing young persons: a pilot study

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Purpose: Down syndrome (DS) is a chromosomal abnormality that can result in difficulty with strength, balance, coordination, and endurance. There is no literature that examines the extent of these problems in individuals with DS or a comparison to an age matched group of typically developing (TD) peers in the children/young adult population. Therefore, the purpose of this pilot study was to compare the fitness level of persons with DS to an age and gender matched group of TD peers. The second purpose was to determine if a relationship exists between the impairments of ankle strength, balance and functional measures.

Methods: Sixteen participants with DS and thirteen age and gender matched TD peers participated in this study. Participants were enrolled in a local tennis camp. Balance was assessed using single limb stance, plantarflexor strength was assessed using the modified heel rise test, coordination was assessed by hitting a ball with a tennis racquet, endurance was assessed using the 3-minute step test, and overall fitness was measured by the timed-up-and-go test.

Analyses: A multivariate ANOVA was used to determine differences between groups ($p < 0.05$). A Pearson correlation was performed to determine if there was a relationship between impairments and function.

Results: Statistically significant differences were found for all tested variables between the DS group and TD group. Balance, strength, and overall fitness outcomes were the most different with a p-value of < 0.001 . Significant correlations were found between the heel rise and the timed-up-and-go ($r = 0.316$, $p = 0.001$), as well as single limb stance and the timed-up-and-go test ($r = 0.348$, $p = 0.001$).

Discussion and Conclusion: Based on the results children and young persons with DS have decreased fitness levels compared to their TD age and gender matched peers. Although the step test yielded a p-value of 0.046, the results of the step test could not be considered clinically significant due to complications during testing. The impairments of ankle strength and balance were significantly related to functional measures. Overall, the findings suggested that physical therapists should be aware of the differences in fitness levels when recommending an exercise program and intensities in the treatment of children and young persons with DS. Further investigation with a larger sample size of individuals with DS may be warranted to confirm the difference in fitness levels in comparison to a group of TD age and gender matched peers.