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Posturography-Based Rehabilitation for Friedreich's Ataxia: A Prospective Study on Balance and Functional Performance

Topic: Virtual Reality

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BACKGROUND

Friedreich's ataxia (FA) is a rare autosomal recessive neurodegenerative disorder caused by a trinucleotide (GAA) repeat expansion in the FXN gene on chromosome 9, resulting in reduced frataxin expression. This leads to mitochondrial dysfunction, oxidative stress, and progressive degeneration of the spinocerebellar, corticospinal, and dorsal column pathways, manifesting as gait ataxia, impaired proprioception, and muscle weakness. The progressive nature of FA significantly affects patients' functional independence and quality of life, making targeted rehabilitation strategies essential.

METHODS

This study aimed to evaluate the effectiveness of a twelve-week posturography-based rehabilitation program in enhancing proprioception, balance, and functional capacity in FA patients. Conducted from June 2022 to June 2023 at the Physical Medicine Department in Casablanca, the study included eight patients (mean age: 30 ± 5 years; 60% male) with a confirmed FA diagnosis.

Functional performance was assessed using the Friedreich Ataxia Impact Scale (FAIS), the Friedreich Ataxia Rating Scale (FARS), and dynamic posturography, which served both as an assessment tool and rehabilitation technique. Dynamic posturography provided objective measures including ellipse area, COP X, COP Y (extent of center of pressure sway), and limits of stability in both the frontal and sagittal planes.

RESULTS

Functional performance was evaluated at baseline (T0) and 12 weeks (T12) using the FAIS, FARS, and dynamic posturography. Results showed slight improvements across all measures. FAIS scores decreased from 55.2 (T0) to 52.3 (T12), indicating a slight reduction in the impact of the disorder on quality of life. FARS scores improved marginally from 40 (T0) to 38 (T12), suggesting small neurological gains. Dynamic posturography revealed improvements in postural control: ellipse area reduced from 23.5 cm^2 (T0) to 20.4 cm^2 (T12), COP X reduced from 4.2 cm to 3.5 cm, and COP Y reduced from 5.3 cm to 4.2 cm. Limits of stability also improved, with the frontal range increasing from 7.5° (T0) to 8.3° (T12) and the sagittal range increasing from 5.2° (T0) to 6.5° (T12).

CONCLUSION

The findings suggest that posturography-based rehabilitation is a promising intervention for improving proprioception, balance, and motor function in FA patients. Given the progressive nature of the disease, integrating neuromodulation through platform posturography may further enhance the effectiveness of rehabilitation strategies.

Statement of Disclosures

None

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