



MICRO-PROCESSOR CONTROLLED KNEE-ANKLE-FOOT ORTHOSIS (C-BRACE) VS. STANCE-CONTROL KNEE-ANKLE-FOOT ORTHOSIS (SCO) AND CONVENTIONAL KNEE-ANKLE-FOOT ORTHOSIS (KAFO): FUNCTIONAL OUTCOMES IN INDIVIDUALS WITH LOWER EXTREMITY IMPAIRMENTS DUE TO NEUROLOGIC OR NEUROMUSCULAR DISEASE, ORTHOPEDIC DISEASE OR TRAUMA

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INTRODUCTION

A KAFO that provides mechanical support while allowing greater control in swing and stance phases of gait may increase the user's ability to walk with decreased metabolic cost and allow improved functional mobility and participation in functional activities. The Micro-processor control (C-Brace) applied to the KAFO could allow for more control during the swing and stance allowing for independence in walking on uneven surfaces, stair climbing, and self-correction during tripping^{1,2}. The Aim of the study was to evaluate the potential of the C-Brace to improve the functional mobility and quality of life in individuals with lower extremity impairments as compared to the SCO and conventional KAFO.

METHOD

Subjects: 12 individuals using a locked KAFO were randomized to either SCO or C-Brace.

Procedures: following an acclimation period of one month, participants were evaluated on device use in their home for another month. Following which, participants crossed-over to the other device group (SCO or C-Brace) and received a month of acclimation followed by home trail. Outcome measures included no. of times specific ADLs were performed at home (stair climbing, walking, etc.), metabolic cost during ADLs, device use at home and in the community, QOL. Advanced wearable sensors, GPS tracking, machine learning techniques were applied to quantify devices use at home.

Data Analysis: each participant acted as their own control. A two-way repeated measures ANOVA was used with time and device as factors to compare between and within groups.

RESULTS:

Initial results indicate that c-brace increases the number of times adls are performed such as stair climbing at home and in the community compared to the sco or kafo. In addition the metabolic costs performing the adls were lower in the C-brace usage time. In addition, the community mobility and social interaction measured using gps tracking was significantly higher in the c-brace users compared to sco or kafo.

DISCUSSION

Appropriate patient selection, acclimation, systematic and customized fitting of the C-Brace seems follow participants to perform ADLs at a higher rate but also perform large set of different ADLs compared to their predicate device. In addition, a lot of these ADLs are performed at different settings further improving overall quality of life.

CONCLUSION

Micro-processor controlled KAFO's providing advanced stance and swing control could significantly improve ever day mobility, functional activities, and quality of life in KAFO users.

CLINICAL APPLICATIONS

Advanced microprocessor controlled KAFOs even though more expensive than traditional devices does provide a much higher quality of life in terms of home and community mobility and social interaction. This gain in the long run will balance cost benefit ratio and help with the question of health care economics also.

REFERENCES

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