

Improved physical function using a power enhancing glove in persons with IBM



#Malin Regardt^{1,2}, #Helene Alexanderson^{2,3}, Stephanie Hunn⁴, Lindsay N Alfano⁵, Roland Mischke⁶, Ingrid de Groot⁶, Anneli Dihkan⁶, Therésia Danielsson⁷, Annika Rydgård⁷, Humza A Chaudhry⁸, Lesley-Ann Saketkoo⁸ On behalf of MIHRA Exercise and Rehabilitation Scientific Working Group.

Shared first author. 1 Department of Neurobiology, Care Sciences and Society, Division of Occupational Therapy, Karolinska Institutet, Stockholm, Sweden. 2 Women's Health and Allied Health Professionals Theme, Karolinska University Hospital, Stockholm Sweden. 3 Department of Medicine, Solna, Division of Rheumatology, Karolinska Institutet, Stockholm, Sweden and Women's Health. 4 Department of Neurology, Neuromuscular Division, Washington University School of Medicine, St. Louis, United States. 5 The Abigail Wexner Research Institute at Nationwide Children's Hospital, Center for Gene Therapy, Columbus, OH, United States; The Ohio State University College of Medicine, Department of Pediatrics, Columbus, United States. 6 Patient Research Partner from Germany, The Netherlands, Sweden. 7 Bioservo Technologies AB, Stockholm, Sweden. 8 Louisiana State University and Tulane University Schools of Medicine, New Orleans Scleroderma and Sarcoidosis Patient Care and Research Center, University Medical Center Comprehensive Pulmonary Hypertension Center and Interstitial Lung Disease Clinic Programs, New Orleans, USA.

Conclusion

Based on preliminary analysis the glove appears to increase hand function and might improve physical function in persons with IBM who experience impaired hand function. However, persons with severe limitation in combination with reduced function in the arm might not benefit of the glove in daily activities. A prospective intervention study is planned to further investigate the usefulness of the glove.

Introduction

Individuals with IBM have reduced hand function leading to limitation in daily activities. There is an urgent need to develop therapies and assistive devices to improve every-day function and quality of life for individuals with IBM.

Aim

To investigate if a power enhancing glove is feasible to use in persons with IBM.

Methods

Data were collected during The Myositis Association's (TMA) patient conference in 2023.

Participants: Individuals with IBM self-reported hand weakness.

The glove's assistive force in grip and pincer strength is triggered by an 'intention-detection' logic that reacts to and supports the follow-through of a hand movement initiation by the user (Figure 1).

Measures: Physical function: IBM-Patient Reported Outcome, Upper Extremity Function Scale (IBM-PRO) and IBM-Functional Rating Scale (IBM-FRS)

Health related quality of life: EQ5D VAS

Grip strength: Jamar

Procedure: Participants selected three activities experienced as difficult and important. They performed the selected activities rating their perceived limitation on a 5-point scale (0 = "unable to do", 4= "without any difficulty") first without the glove and then upon using the glove. The glove was fitted individually to the left or right hand.

After testing the glove, the participants answered a series of open-ended questions regarding their perception of the glove.

Statistics: Wilcoxon signed rank test were performed to analyze differences between perceived limitation with and without the glove using.

Results

The study included 40 individuals with IBM, (Table 1).

The three most selected activities were *lifting free weights, open previously opened jars, lift a heavy bag from the floor, holding a frying pan and picking a coin from a table.*

All activities were perceived easier to perform with the glove ($p \leq 0.039$) with ratings on perceived limitation reflecting "with little difficulty" (3) to "without difficulty" (4).

Table 1. Demographic data and status on the participants.

Demographic and status	IBM, n=40
Age md (IQR), years	69 (64-74)
Gender male/female (%)	52.3/47.5
IBM FRS (0-40) md (IQR)	20 (14-25)
PRO-UEFS for IBM (0-48) md (IQR)	23 (15.5-33)
EQ5D VAS (0-100) md (IQR)	74.5 (66.25-83.75)
Jamar right hand md (IQR) kilogram	4.3 (1.6-10.7)
Jamar left hand md (IQR) kilogram	3.2 (1.3-9.6)

IBM=inclusion body myositis, FRS=functional rating scale, md= median, IQR=interquartile range, EQ=EuroQoL, VAS=visual analogue scale.

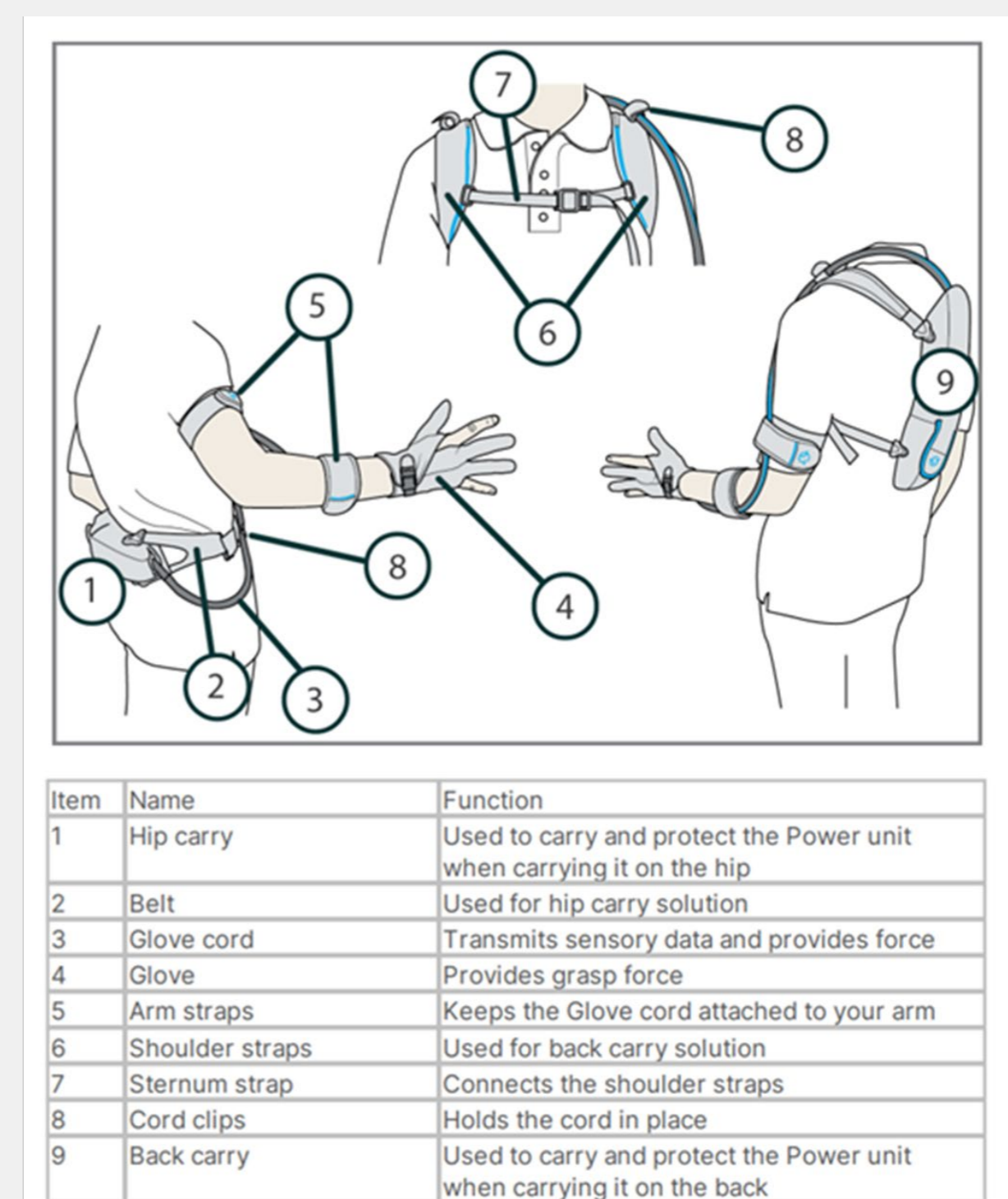


Figure 1, power enhancing glove

In the open-ended questions, participants documented that the glove would be beneficial for use in everyday tasks, lifting objects, grocery shopping, stabilizing the hand and would increase independence.

Most of the participants did not foresee activities in their daily routine where it might not work, however, some persons conveyed foreseeing some difficulty of glove use during personal hygiene and social activities.

A few showed an interest to use the glove on both hands.

Those with only little limitation in hand function thought it would be more beneficial when the hand function was more limited. Those with severe limitation in hand function, especially in combination with reduced arm strength were not helped in activities by the glove.



malin.regardt@regionstockholm.se



helene.alexanderson@ki.se



Karolinska Institutet

