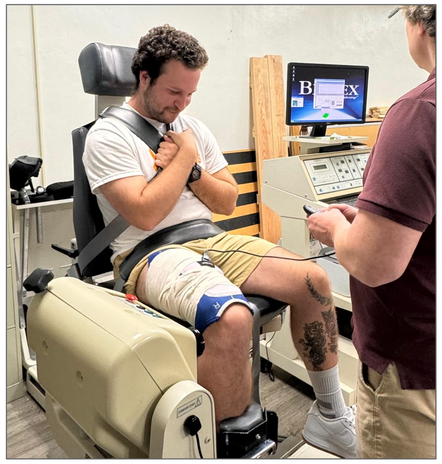
# KNEEHAB MULTIPOLAR ELECTRICAL STIMULATION AND MUSCLE FATIGUE

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## Introduction

- This study aimed to compare the muscle fatigue produced by the Multipolar Kneehab Electrical Stimulation Garment (MKESG) and the Monopolar Grass Stimulator (MGS).
- The MGS uses conventional electrical stimulation for Neuromuscular Electrical Stimulation (NMES) employing a unidirectional current between two electrodes placed over the muscles.
- The MKESG unit is a garment with 4 electrodes attached the the skin side surface of the unit. It uses multiple current pathways between electrodes rather than the conventional unidirectional currents of the MGS.
- The claim that we are testing is that the MKESG will reduce muscle fatigue. The theory behind this statement is that the current varies between electrodes so that different muscle fibers are activated during each contraction.



## Methods

- Fifteeen participants were recruited and served as their own control. Following a 5 minute warm up on a cycle ergometer the following protocol was performed initially with the MKESG on the right leg and then with the MGS on the left leg.
- Participants performed 3 maximum volitional isometric contractions (MVICs) of the knee extensors with a Biodex force dynamometer to find the peak muscle torque produced.
- Maximal tolerated electrically-elicited torque (MTEET) for a 10-second contraction was determined and the resultant peak torque was recorded as a percentage of MVIC.
- Following 5 minutes of rest, a fatigue protocol was initiated consisting of 15, 10-second contractions with a 1 second ramp up time and 10 second rest between contractions.
- The MVIC of the left knee extensors was then found and the intensity of the MGS was set to produce the same percentage of peak torque found with the MTEET on the right leg, and then the same 15 contraction fatigue protocol was tested.
- A fatigue index was calculated by dividing the peak torque of the final contraction by that of the initial contraction. Average peak torque across repetitions was also determined, and paired t-tests were used to compare the dependent variables.

## Conclusion

- The study's findings do not support the hypothesis that the MKESG stimulator reduces muscle fatigue compared to the MGS, as no statistically significant differences were observed in the fatigue index or average peak torque
- These results suggest that varying electrical current across different electrodes during NMES may not be an effective strategy for reducing muscle fatigue, or that the specific parameters of the MKESG device are insufficient to produce this effect
- Clinical Relevance: The MKESG does not appear to reduce electrically elicited muscle fatigue, clinicians prioritizing this should explore alternative strategies

## Results

- There was no statistically significant difference observed between MKESG and MGS.

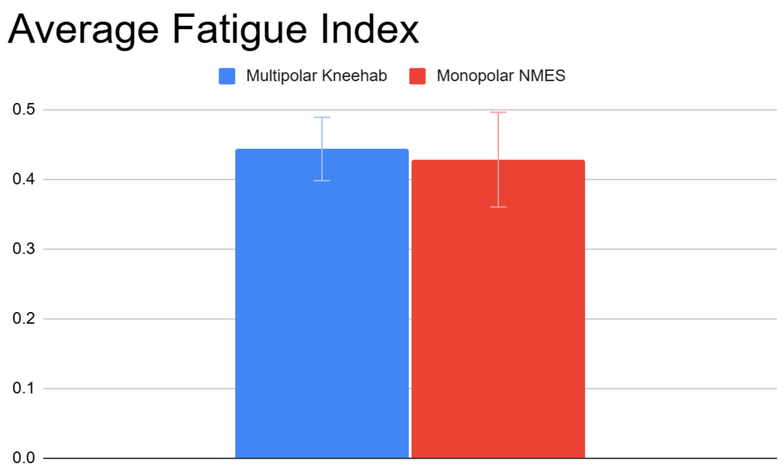



Figure 1. The average fatigue index for the MKESG (44.3 ± 13.7) and the MGS (42.8 ± 13.7). There was no statistical difference (p = 0.34).

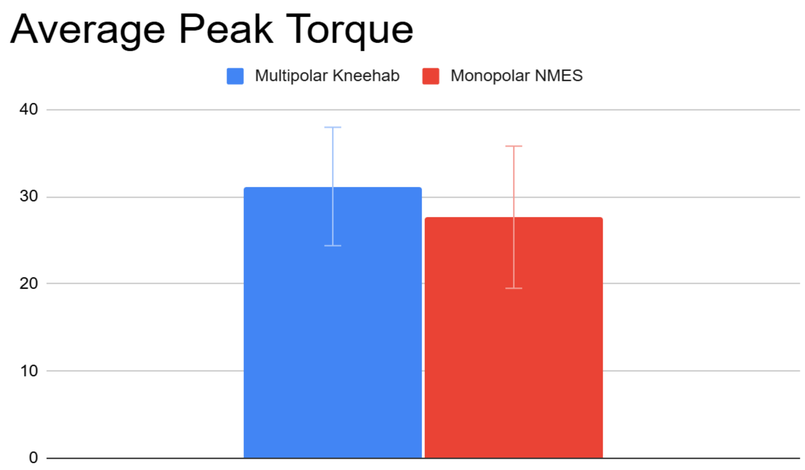



Figure 2. The average peak torque produced by the MKESG (31.2 ± 17.8 Nm) and the MGS (27.6 ± 16.1 Nm). There was no statistical difference (p = 0.07).