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Pilot Study on the Interplay Between Muscle Strength, Demographics, and Physical Function: Early Insights and Implications for Design and Health

Keywords: Muscle strength, functional examination, dynamometry, electromyography

Objectives: This study investigates the interplay between muscle strength, electrical activity in upper limb muscles, and demographic factors' impact on physical function.

Methods: Analyzing 17 healthy volunteers (average age 24.2, median 22±4.254, 94% right-handed), we examined eight muscle pairs (deltoids, biceps, brachioradialis, triceps, wrist flexors, and extensors) through clinical muscle strength tests, surface electromyography (sEMG), and dynamometry, using IBM SPSS 27 for statistical analysis.

Results: The investigation into muscle strength and electrical activity across eight pairs of muscles revealed significant correlations ($p < 0.001$) in maximum muscle strength on both sides for most muscle groups. A notable correlation ($p < 0.05$) between Body Mass Index (BMI) and muscle strength was identified across most muscle groups, although no significant correlation was found with the spectral mean. Age demonstrated a significant correlation ($p < 0.05$) with the spectral mean in the deltoids and wrist extensors. Gender showed a significant correlation with dynamometry in most cases ($p < 0.05$) but not with spectral mean. Given the study's limited sample size, these findings are considered preliminary and necessitate further research.

Conclusion: This pilot study has uncovered links between muscle strength, body composition, and electrical activity across various muscle groups, highlighting the complicated nature of muscle functionality. These findings emphasize the importance of ergonomic considerations and signal the need for more comprehensive research to enhance our understanding of these relationships.

Primary authors: Dr BURČEŅA, Marija (Riga Stradins University); Ms SKRASTIŅA, Sigita (Riga Stradins University); Ms STAPULONE, Patricija (Riga Stradins University); Ms KIVLENIECE, Madara (Riga Stradins University); Prof. RESTE, Jeļena (Riga Stradins University)

Presenters: Dr BURČEŅA, Marija (Riga Stradins University); Ms SKRASTIŅA, Sigita (Riga Stradins University)