

EMG analysis for pre-clinical trials of hand rehabilitation tasks

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2009

Ang, K. Y. (2009, March). EMG analysis for pre-clinical trials of hand rehabilitation tasks. Presented at Discover URECA @ NTU poster exhibition and competition, Nanyang Technological University, Singapore.

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EMG Analysis for Pre-clinical Trials of Hand Rehabilitation Tasks

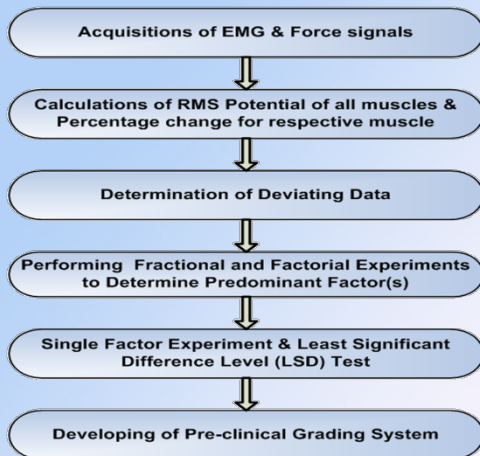
Objective

To determine the predominant factor(s) affecting EMG-force signals via design of experiments (DOE) – thus develop the Pre-clinical Grading System.

Scope

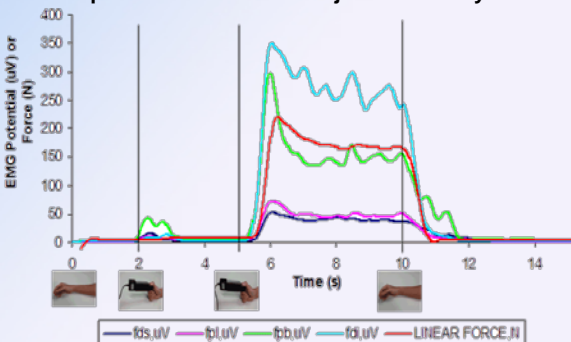
EMG signals of 5 muscle groups and force exerted are obtained from a total of 25 subjects. 5 factors – **Age**, **Gender**, **BMI**, **Hand Size Ratio** and **Frequency of Exercise/week** – are also taken into consideration.

Flowchart of Experiments



Sample Results

Lateral pinch test of a male subject below 45 years old



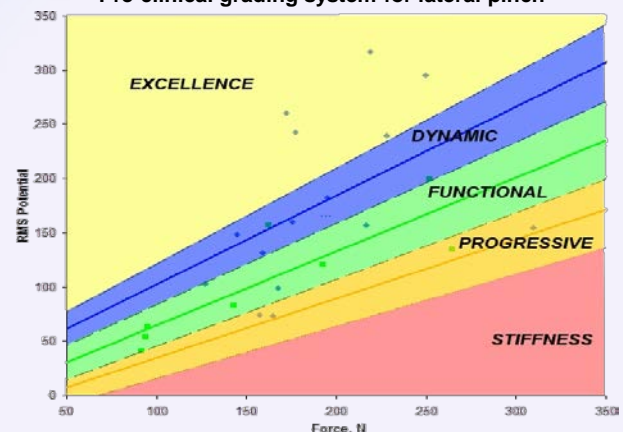
Test ratio and t-value for specific rehabilitation tasks

	Lateral Pinch	Pulp Pinch	5-Pulp Pinch	Power Grip	Tripod Pinch
ANOVA on Age Single Factor					
Test Ratio, F ₀	32.96*	5.81*	20.78*	2.27	16.08*
t-value:					
Levels 1 & 2	6.13*	1.58	6.14*	-	3.30
Levels 1 & 3	7.68*	3.41	4.78*	-	5.65*
Levels 2 & 3	1.55	1.83	-1.35	-	2.35
ANOVA on Gender Single Factor					
Test Ratio, F ₀	0.17	1.41	7.13*	0.00	0.58
t-value:					
Levels 1 & 2	-	-	16.59*	-	-

* Significant at $p \leq 0.05$ level

Age is a primary factor of EMG-force signals and there are significant differences among age groups.

Pre-clinical grading system for lateral pinch



Concluding Remarks

Pre-clinical Grading System for hand rehabilitation is developed based on the various age groups. A total of five statuses – '**excellence**', '**dynamic**', '**functional**', '**progressive**' and '**stiffness**' are created to classify patients or users.

Apart from enlarging the sample size, it is best to engage patients with **spinal cord injury** and **post-stroke** for testing to reinforce the results achieved.