

A study of relationship between muscle and sitting position with rehabilitation device

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Abstract

The rehabilitation effect is judged by Physical therapist and sometimes the judgment of rehabilitation effect are different because his/hers judge standard is different. One of the differences is the posture of the subject. Therefore, in this paper we have subjects move the lower limbs using the instrument and we measured an electromyogram (EMG) of the lower limbs and the angle of the knee as a parameter of the height of the chair a subject sit seats. As the results, it was found that the sitting position is important when an EMG is measured to judge the ability of the lower limbs.

Introduction

We measured the knee angle of the subject and an EMG of the limbs to judge whether results of EMG are different. The subjects move their lower limbs one back and forth movement in two seconds for 12 times. As the parameter the height of the chair is changed. The number of the subject is eight, two female and six male.

Experiment

The subject exercised the training using the lower limbs movement device called as Koro. The movement is to move feet back and forth as shown in Fig.1. As the height of the chair, (a) Minus 5cm is the sitting position which is to reduce 5cm from the standard position. (b) Standard position is the sitting position that the upper legs are horizontal. (c) Plus 5cm is the sitting position which is to raise 5cm from the standard position.

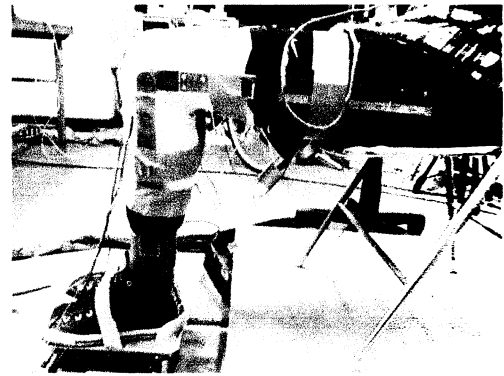


Fig.1 Lower limbs movement using Koro

Results

The time history results of the feet movement and the EMG are shown in Fig.2. When moving forward, the knee angle becoming larger, the subject did not use Tibialis anterior in section 1 in Fig.2. When moving back, the knee angle becoming small, the subject used the Tibialis anterior in section 2.

We calculated nARV which is divided average rectified value of EMG by the time. The values are shown in Table 1. We found that when the same subject exercises in three sitting position, the difference of the same muscle nARV is significant different. Therefore the chair height is significant in measuring the effects of the rehabilitation.

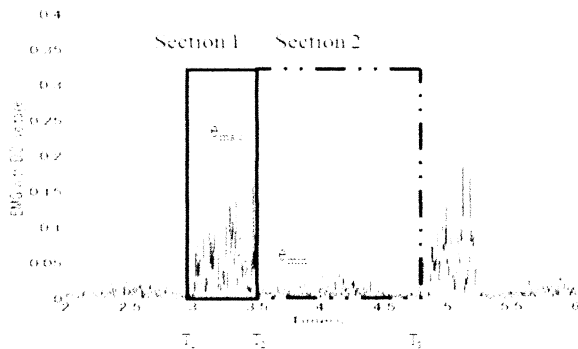


Fig.2 Movement and EMG of Tibialis anterior

Table 1 Comparison of Tibialis anterior analysis

Subjects	Muscle	Statistic	Results
No.2	Soleus	F-value	plus 5cm>minus 5cm
		66.906*	
No.2	Gastrocnmius	T-value	minus 5cm>standard 5cm
		6.1396*	
No.3	Rectus femoris	T-value	minus 5cm>standard position
		13.71*	
No.3	Gastrocnmius	T-value	minus 5cm>plus 5cm >standard position
		2.81*	
No.5	Gastrocnmius	T-value	minus 5cm>standard position
		1.703*	
No.6	Tibialis anterior	F-value	plus 5cm>standard position
		47.566*	
No.8	Tibialis anterior	F-value	minus 5cm>plus 5cm
		63.586*	
No.10	Soleus	F-value	minus 5cm>plus 5cm
		10.92*	
No.11	Gastrocnmius	F-value	standard position > plus 5cm
		106.613*	