

Evaluation of patients with chronic pain disease and physically unimpaired persons with use of physiological tremor and mechanomyogram.

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SUMMARY

In recent years, the chronic pain diseases were possible to be evaluated by the physiological tremor and mechanomyogram from the standpoint of biomechanism, and this method of objective evaluation was found here and there.

The purpose of this study is to establish an objective index to clarify differences between physically unimpaired persons and patients with chronic pain disease by using physiological tremor of mechanomyogram occurring within an organism.

A total of 69 subjects constituted this study. There were 20 physically unimpaired males and 49 patients with chronic pain disease.

The wireless system with three dimensional acceleration's sensor from CCI Inc (Type RE-ECG, MESI) was used to measure physiological tremor and mechanomyogram. The sensor was affixed to interscapular region in the upright position and forward bent position at 30 degrees.

Total power was significantly different in the upright position among the groups between physically unimpaired persons and patients with chronic pain disease ($P<0.01$). Significant differences in total power were also found in forward bent position at 30 degrees among the groups too ($P<0.01$).

The patients with chronic pain disease had deviant total power spectrum at particular frequency compared to the physically unimpaired persons and their physiological tremor appeared excessively.

INTRODUCTION

There was no obvious cause of chronic pain disease. The obvious cause of chronic pain disease is not still found. The symptomatic therapy has been mainly taken. Therefore, the main approach and treatment for the chronic pain disease have not established.

In recent years, the chronic pain diseases were possible to be evaluated by the physiological tremor and

mechanomyogram from the standpoint of biomechanism, and this method of objective evaluation was found here and there.

The purpose of this study is to establish an objective index to clarify differences between physically unimpaired persons and patients with chronic pain disease by using physiological tremor of mechanomyogram occurring within an organism.

METHODS

A total of 69 subjects constituted this study. There were 20 physically unimpaired males (mean age, 30.0 ± 6.3 years) and 49 patients with chronic pain disease (21 males and 28 females, mean age, 59.3 ± 19.7 years).

The wireless system with three dimensional acceleration's sensor from CCI Inc (Type RE-ECG, MESI) was used to measure physiological tremor and mechanomyogram. The sensor was affixed to interscapular region in the upright position and forward bent position at 30 degrees. The measuring time is taken for three minutes. The original waves of physiological tremor and mechanomyogram were recorded as the acceleration waveform. Total power was derived from sum of power spectra in the frequency region set (1 Hz to 30Hz). Total power for patients with chronic pain disease and physically unimpaired persons in conditions of standing are compared.

The Welch's T-test was used to analyze the data for patients with chronic pain disease and physically unimpaired persons with a significance level of 0.01.

RESULTS AND DISCUSSION

Total power was significantly different in the upright position among the groups between physically unimpaired persons and patients with chronic pain disease ($P<0.01$) (Figure 1). Significant differences in

total power were also found in forward bent position at 30 degrees among the groups too ($P < 0.01$) (Figure 2).

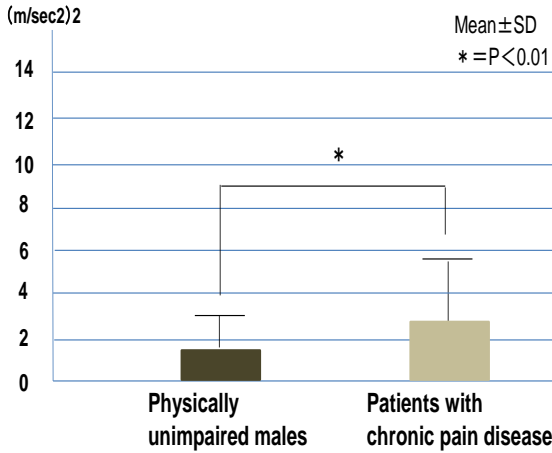


Figure 1: Evaluation of mechanomyogram in the upright position.

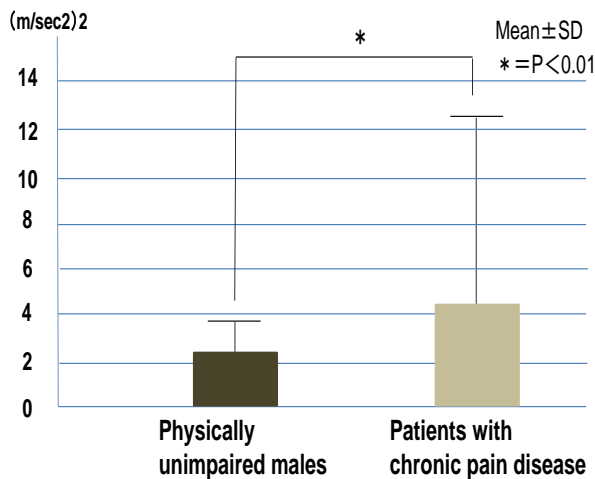


Figure 2: Evaluation of mechanomyogram in forward bent position at 30 degrees.

Findings suggest that the physiological tremor and mechanomyogram denote the objective index to find the difference between patients with chronic pain disease and physically unimpaired persons. Furthermore physiological tremor and mechanomyogram are able to apply to evaluate the effect of treatments for the patients. Future work will be required to confirm them.

CONCLUSIONS

The patients with chronic pain disease had deviant total power spectrum at particular frequency compared to the physically unimpaired persons and their physiological tremor appeared excessively. Excessive physiological tremor indicates excitableness of both central nervous system and spinal reflex. Mechanomyogram also showed the similar tendency as the same as physiological tremor. It is found that this excitableness is the possible factors to cause chronic pain disease.

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REFERENCES

1. K.Sakamoto, et al, Biomechanism Library. Tremor and Vibratory Perception in a Living Body Functional Evaluation of Mechanical Vibration. Society of Biomechanisms Japan. 2-8,2-66,2009