AGE GROUP DIFFERENCES OF CONTROLLED FORCE EXERTION BY A COMPUTING BAR CHART TARGET-PURSUIT SYSTEM IN JAPANESE FEMALE ADULTS

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Background & Purpose
It is known that physical fitness (muscle-nerve function) generally decreases with age, and individual differences are large in the elderly (Bemben et al., 1991). Nagasawa et al. (2000) reported that the elderly subjects had weaker controlled force exertion than the young subjects, although large individual differences were observed. On the other hand, it is important to develop a test to estimate individual's measurements based on certain kinds of standards. However, because the measurements vary with age, it is difficult to make up a common standard for all age groups. In order to devise evaluation criteria for each age group, it is necessary to examine the age group differences of controlled force exertion values. According to Nagasawa et al. (2004), the ability exerted by a type of a displayed demand value is somewhat different. In this study, the age group differences of controlled force exertion values on the bar chart display were examined. Based on results of previous studies, we hypothesized that the controlled force exertion value decreases with age. The purposes of this study were to examine age group and individual differences in the measurements of the controlled force exertion test by the bar chart display and to propose a norm in Japanese female adults.

Methods
The subjects were 249 female adults aged 15 to 84 years (Age 41.7±19.1 yrs, Height 156.3±6.4cm, Weight 53.0±6.9kg). The subjects matched their submaximal grip strength to changing demand values, appearing with a bar chart motion on the display of a personal computer. The subjects performed the controlled force exertion test three times with 1-min intervals (one trial was 40 sec.), after one practice trial using the dominant hand. A total of the differences between the demand value and the grip exertion value for 25 sec. was used as an evaluation parameter.

Results & Discussion
The measurements showed a right-skewed distribution without a normal distribution. They showed a normal distribution after logarithmic transformation (W=0.09, p>0.05). The measurements of the controlled force exertion test seemed to be necessary to produce a norm after logarithmic transformation. The result of the analysis of variance showed significant differences in the means of each age group (F=44.12, p<0.05), and test performance tended to decrease after 40 years of age. Considering the above-stated age group difference, the norm of each age group was established. It is possible to evaluate the characteristics and recovery conditions of movement function, based on the evaluation criteria.

Conclusions
The controlled force exertion value by the bar chart display decreases markedly after 40 years of age. It is possible to adequately evaluate the individual controlled force exertion based on the devised evaluation norm in this study.

References

Keywords: Feedback, Force Measurement, Motor Control