Development of a system to indicate the features of the pole works in Nordic walking

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Nordic walking, or walking with poles, is known as an effective aerobic activity that uses the whole body, including the muscles of not only the lower body but also those of the arms and the upper body. The benefits of Nordic walking are that it can easily be started regardless of the season, and the effect of the exercise is achieved within a short time. Created in Finland, Nordic walking has been increasingly becoming popular in Europe. Recently, Nordic walking has received increased attention from middle-aged people, including those in Japan. Previous studies aimed toward the scientific verification of the benefits of Nordic walking mainly focused on the alleviation of the load on the legs provided by the poles and on the energy consumption. Although a difference in the load on the legs and the energy consumption is expected to occur with technical mastery of the use of the poles, detailed research on this issue has yet to be conducted.

Therefore, we analyzed the techniques of both experts and beginners of Nordic walking to gather basic data about their differences. We developed a system to acquire data by using a three-axis accelerometer attached to the tip and grip of the poles used in Nordic walking. The sensors do not disturb body movements because they have batteries and send data to a PC via wireless connection using ZigBee. We collected and analyzed the data from both experts and beginners by using this system.

One of the results of the analysis indicated that two or more significant peaks existed in the power spectrum of the data of the experts, whereas only one significant peak existed in the power spectrum of the data of the begin- ners. The features identified will be useful indexes to differentiate between experts and beginners.

Using the results, we developed a system to analyze the data and indicate the features during the pole work. The system automatically counts the number of peaks in the power spectrum of the data recorded on the PC during the pole work, and then reports the results by sound indications. It enables the users to check their own present pole work through the indications. We believe that the developed system contributes to research on the relations between the load and the pole work and the improvement in the pole work of beginners.