An analysis of the difference between direct and automated anthropometric measurement using a 3-D tool for the age group of 70-85 elderly.

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The ISO (International Organization for Standardization) recommends anthropometry landmark and items of lateral and vertical direction. Lately. Automated measurement programs have been used for the quick acquisition and application of anthropometric dimension and data. These programs are based on the recommendation of ISO anthropometry points and items of lateral and vertical direction(Han, Nam, & Choi, 2010). However as the age increases, the posture changes in the form of back bending and waist stooping(Jeong Yim Lee & Lee, 2008). Therefore existing anthropometry methods could be unsuitable for the elderly. In this study, the suitability of an automated anthropometry method was evaluated by comparing the data of direct measurement and automated measurement, and considered is the potential modification of automated methods based the results of the study.

This study performs the direct measurement and the 3-D automated measurement with scanning of 33 anthropometric items for 464 men, 465 women of the age group between 70 to 85. The data acquired from the direct measurement and the automated measurement was compared with the error tolerance verification method recommended by ISO 20685. The difference between the direct measurement data and automated measurement data is analyzed. In addition, a one-way ANOVA from the SPSS 21.0 statistical program was used for the analysis of variations of the measured anthropometric data by the age group.

The average error tolerance levels recommended by ISO are as follows: arthromere length 5mm, body height 4mm, large part circumference 9mm, small part circumference 4mm, head size(includes hair) 1mm, head size(not includes hair) 2mm. This study compares the difference between the direct measurement data and the automated measurement data with the average error tolerance levels recommended by ISO20685. The result of comparison of anthropometric items including arthromere length was average 11.59mm. The results show that the average 69.86% of the subject exceeded the maximum average error recommended by ISO.

The difference between the direct measurement and the automated measurement data for anthropometric items including large part circumference was average 20.37mm, which exceeded the ISO recommended error tolerance level for the average 63.56% of the study subject. The difference for anthropometric items of small part circumference was average 11.85mm, which shows the average 71.92% of subject exceeded the ISO recommendation. The difference for head size (includes hair)was average was 13.19mm that shows the average 96.61% of subject exceeded, and the difference for head size (not including hair) was average 10.41mm that shows the average 87.81% of subject exceeded the ISO standard. In the case of body length the

difference in stature was average 6.76 that means the 55.41% of subject exceeded the ISO recommendation. These results show that the difference between two measurements for the most of anthropometric items had exceeded the standard of average error tolerance (ISO), and modifications are required for automated measurement tools, and direct measure methods also need further examination.

The results of correlation analysis for the difference between the direct and automated measurement data are as follows: Bust circumference and under bust circumference had a relatively high positive correlation value, 0.43($p<.001$), Waist Circumference (Omphalion) and Hip Circumference was 0.808($p<.001$), and Head Circumference and head length had a relatively high positive correlation value 0.54 ($p<.001$). In other words, if the difference of Bust circumference is huge, the difference of under bust circumference is also huge, and Waist Circumference - Hip Circumference, Head Circumference - head length shows similar trends.

To analyze the difference of the direct and automated measurement data for further segmented age groups (group 1: age 70 to 75; group 2: age 76 to 79; group 3: age 80 to 85), a one-way ANOVA was performed. As a result, the difference between the results of the two measurements for Stature, under Bust Circumference, Minimum Leg Circumference, Head Height, Neck Point to Vertex to Neck Point, shows that group 3 was significantly higher than group 1 and 2($p<.001$), and for the Wrist Circumference comparison, group 2 and 3 were significantly higher than group 1($p<.01$). It is assumed that these results are related to the change of body shape as the age increases with bended back, slenderized limbs, legs and arms and mastoptosis.

In this study the number of anthropometric items analyzed were insufficient to compare all of the detailed segmented items, and the study subject was limited to Korean men and women. Consequently, this study has limitations in generalizing the results for all populations. In the future study, it is recommended that the automated anthropometric tool needs taking into account the characteristics of the elderly people's body shape.

References

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