Evaluation of Human Indices of Obesity Using 3D Scanning Data

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Abstract

BMI (Body Mass Index) and waist to hip ratio are two most widely applied human indices of obesity presently. The applications include evaluating the risks of occupational disaster, evaluating the risk of chronic diseases, studying the relations between body images and indices of obesity, and etc. Yet the expres-sion of BMI and waist to hip ratio about the variation of human somatotype is not clear. This might due to the analysis limitations of 1D anthropometric data measured by traditional Martin-type anthropometer acquired in the past. This study calculated human segments' mass index defined as BMI, the variations of these segment mass indices, and the correlation coefficient between them and BMI; using the data measured by 3D human body scanners. The results showed that the variation of waist segment was the most for both gender. The coefficient of variance of female waist segment was up to 51%, the variation of female chest segment was also up to 34%. And the correlation between waist segment, thigh and BMI were very high for both gender. It revealed that the variation of waist and thigh effects the variation of whole somatotype more than other segments. To summarize, BMI is good to represent only whole human somatotype, yet waist to hip ratio does not properly represent the obesity of waist or hip or both waist and hip. For the wide application of obesity indices, it would be more helpful if more proper indices could be defined.

Keyword：anthropometry; 3D human body scan; obesity indices