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VALIDATION OF THE DRILLIS & CONTINI CORRELATION MODEL IN CURRENT ANTHROPOMETRIC DATA

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1 INTRODUCTION

In the field of biomechanics, human body dimensions are of great significance. Researchers may need to design ergonomic workstations, perform kinematic analysis of movement for either sports or labour, develop medical devices, among other applications [1]. Numerous are the possibilities and applications where the dimensions of the body segments are required.

For design purposes, the researchers may perform anthropometric measurements on the individuals. However, in this case, the number of participants tends to be limited due to the extensive effort involved in performing these measurements.

Another possibility may be the consultation of anthropometric data sheets containing measurements in percentiles for assistance in the design. Several anthropometric data sheets are available worldwide, but one drawback is the origin of this data. Some countries provide these data sheets only for specific groups, such as individuals from military forces, which do not represent the general population. For instance, according to the USA data sheets [1], the population is not overweight, meaning that the data is filtered to include only the accepted military individuals. Another example is Australia that uses anthropometric data for sportive applications [1], once again limiting the general assessment of the population.

Another possibility of determining body segment dimensions is using correlation models, with the Drillis & Contini Correlation Model being the most widely used. This model was developed by Rudolfs Drillis and Renato Contini, both from New York University, and published in 1966. This correlation model uses the height of an individual to determine the length of the body segments by multiplying the height by a specific correlation value index. Figure 1 illustrates the various body segments quantified in the model and the corresponding index value.

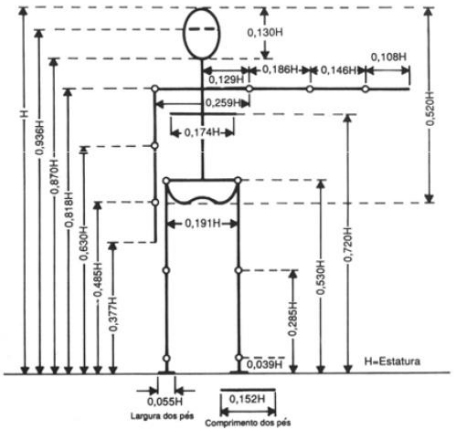

Figure 1 – Drillis and Contini correlation model for the determining body segments based on individual's height.

While this correlation model has broad applicability, it is widely recognized that anthropometric data is highly variable due to the factors that influence the population, such as social habits, physical activities, eating patterns, etc. Considering these factors, over a long period, such as 58 years, significant variations may occur.

Therefore, the objective of this research is to validate the model's correlation index values and determine if these values are still updated or require adjustments.

2 METHODOLOGY

A database was prepared based on the anthropometric measurements of students from the Biomechanics degree from the School of Technology and Management of Polytechnic Institute of Leiria, during several academic years. The first step was to determine the measurements of body segments using the Drillis and Contini correlation model based on statures collected. As mentioned before, this model uses individual's height and a correlation index value to determine the length of the body segments. After performing these calculations, a new database was created. The following step consisted in comparing the two databases, one being the body segment dimensions determined by anthropometric measurements and the other being the body segment dimensions calculated using the Drillis and Contini model. According to the Drillis and Contini model, the authors admit a deviation up to 2 cm in the body segment measurements. Body segment dimensions with differences greater than 2 cm were identified and new correlation index values were determined for those specific segments.

3 CONCLUSIONS

The applicability of correlation models based on the height of individuals for product design, workstations, medical devices, athletic performance is highly demanding. Using an updated body segment dimension tool for general population that is updated offers greater potential for optimized design in various projects.

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