PREDICTION OF RECTUS FEMORIS MUSCLE THICKNESS MEASUREMENTS BASED ON AGE IN WOMEN

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ABSTRACT

The study addresses the prediction of rectus femoris muscle thickness measurements in women based on age. The loss of muscle mass is a common problem associated with aging, with significant health consequences. Sarcopenia, characterized by muscle weakness and loss of independence, is a concerning chronic condition. This study aimed to analyze whether age can be an effective predictor of changes in the cross-sectional area of the rectus femoris muscle in women. For this, 58 women aged between 19 and 66 were subjected to ultrasounds to measure the thickness of the rectus femoris. The results showed that age is a significant, albeit weak, predictor of muscle cross-sectional area. The regression analysis revealed that 18% of the variations in muscle cross-section can be estimated by age. The estimation equation found was 2.139 + (-0.009 x age). This study provides valuable insights into how age can affect the muscle thickness of the rectus femoris in women, highlighting the importance of monitoring muscle health across different age groups.

Keywords: Ultrasound; Muscle; Prediction; Sarcopenia.

INTRODUCTION

In Humans, muscle mass remains relatively stable during the early stages of life; however, after the age of 30, a natural process of reduction begins, at a rate of 0.5 to 1.0% per year.[1] Progressive loss can be mitigated by multifaceted interventions, with regular exercise and nutritional control. This scenario, inherent to aging, incurs serious

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consequences and various chronic diseases, producing significant functional losses, muscle weakness, loss of independence, and an increased risk of falls and death.[2]

The widely accepted diagnostic criteria for sarcopenia require measurements of 3 components: muscle mass, muscle strength, and physical performance[3,4]. Although the algorithm and tests have undergone some changes in the last decade, the main components remain the same. The components are not only applied for diagnosis and determination of severity but also for monitoring the development of sarcopenia[4].

Assuming that muscle analysis and its thickness are one of the validated components for detecting sarcopenia, and that age is a crucial factor for the occurrence of sarcopenia, there arises a need to identify the predictive capacity and how much age would explain the variations in muscle thickness over the years, thus creating a rationale on the subject. Therefore, the central objective of our analysis was to establish the predictive value of age as a mechanism to explain the variations in muscle thickness. Secondarily, we aimed to establish a stratification of muscle thickness based on percentiles in women.

METHODS

A study was conducted with the participation of 58 women aged between 19 and 66 years. The research participants were recruited from the academic community and staff of the Evangelical University of Goiás in the Municipality of Anápolis. The patients who met the inclusion/exclusion criteria were invited to participate in the study. The study was approved by the Research Ethics Committee of the Evangelical University of Goiás (UniEVANGÉLICA), according to opinion CEP nº 6.210.982.

The Mindray B-mode ultrasound model M6 was used to determine the thickness of the rectus femoris (RF) using a linear probe with a frequency of 6-14 megahertz (MHz) model L14-6Ns. The anatomical points of the right thigh femur were adopted, followed by positioning 40% of the femur length towards the proximal region for the analysis of rectus femoris (RF) muscle thickness.

Before the start of the experiment, markings were made on the skin with a pen to standardize the distances between the anatomical points that served as reference for the positioning of the probe. All measurements were taken on the right limb of the subjects. To obtain the images, the subjects were positioned in dorsal decubitus on a stretcher with their legs fully extended and their muscles relaxed for a timed period of 10 minutes. During the process, a generous amount of water-soluble contact gel (Clinigel) was applied directly onto the transducer to minimize image distortion and assist in acoustic coupling.

The analysis visits were conducted at the same time and in the air-conditioned location, which included the presence of a technician to ensure the validity of the aforementioned procedures.

Figure 1: Mindray ultrasound machine B-mode model M6

RESULTS

After analyzing the statistical assumptions, the data were described by mean and standard deviation. The characteristics of the sample used are described in Table 1.

Table 1. Sample Characteristics (N = 58)

	Female (N = 58)	
	Age (years)	Thickness (cm)
Average	29,9	1,86
SD	14,0	0,31

Legend: SD = standard deviation; CSA = cross-sectional area

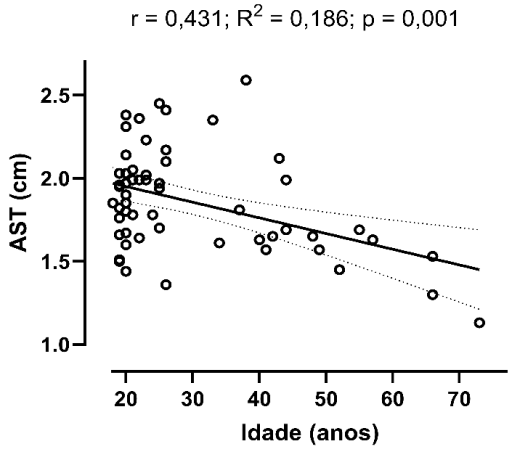
Furthermore, the data were stratified and calculated in percentile form. Table 2 presents the stratified percentile values for the muscle thickness of the rectus femoris.

Table 2. Distribution of experimental data by percentile.

	Percentiles (N = 58)						
	5	10	25	50	75	90	95
Muscle Thickness (cm)	1,33	1,42	1,63	1,82	2,03	2,38	2,43

After sustaining the assumptions, the linear regression analysis demonstrated that age for women is a significant predictor of muscle thickness. However, age does not seem to be the main predictor variable (r = 0.431; R2 = 0.186; p = 0.001), suggesting that changes in muscle volume over time are influenced (18%) and can be estimated from age [F(1,56) = 12.761; p = 0.001). The equation for estimating AST by age in women can be described as: 2.139 + (-0.009 x age). Figure 2 presents the regression line.

Figure 2. Representation of the regression line for predicting muscle thickness



CONCLUSION

It is concluded that age plays a significant role in predicting muscle thickness. However, age does not appear to be the main predictor variable, demonstrating that it only explains 18% of the variations in muscle thickness.

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