The correlation between cutometry and 50 MHz high-frequency ultrasound skin techniques

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Introduction:

High-frequency ultrasound (HFUS) skin imaging analysis is a non-invasive technique that allows a unique approach to the analysis of the skin and its layers [1], [2]. In other hand, skin mechanical properties evaluation provide objective and biologically significant information on the mechanical properties of the skin such as elasticity, firmness and tightening effect, with particular focus on changes caused by aging [3], [4]. In this context, the purpose of this study was to identify whether the traditional cutometry is correlate with HFUS parameters.

Materials & Methods:

1 Experimental design

Open comparative randomized controlled clinical trial.
Approved by the Research Ethics Committee number 3.406.844.

22 women of mean age 47 ± 12 years old.

30 min acclimatization in a climate-controlled room.

20 ± 2°C   55 ± 5%

Parameters were measured by a trained operator in a site measure 3.0 cm of diameter on the right or left volar forearm of the research subjects.

2 Image analysis using high-frequency ultrasound

The images was obtained using 50 MHz HFUS device. The parameters of epidermal and dermal echogenicity, thickness, and area were evaluated according to Vergilio et al. (2021) [1].

3 Skin firmness and elasticity assessments

The increase in skin firmness was evaluated through the Ur/Ue (R5) parameter and the increase in skin elasticity was evaluated through the Ur/Uf (R7) parameter.

4 Statistical analysis

- Pearson's correlation coefficient ($\alpha = 0.05$)
- Autoscaling and principal component analysis (PCA) multivariate analysis technique.

Results & Discussion:

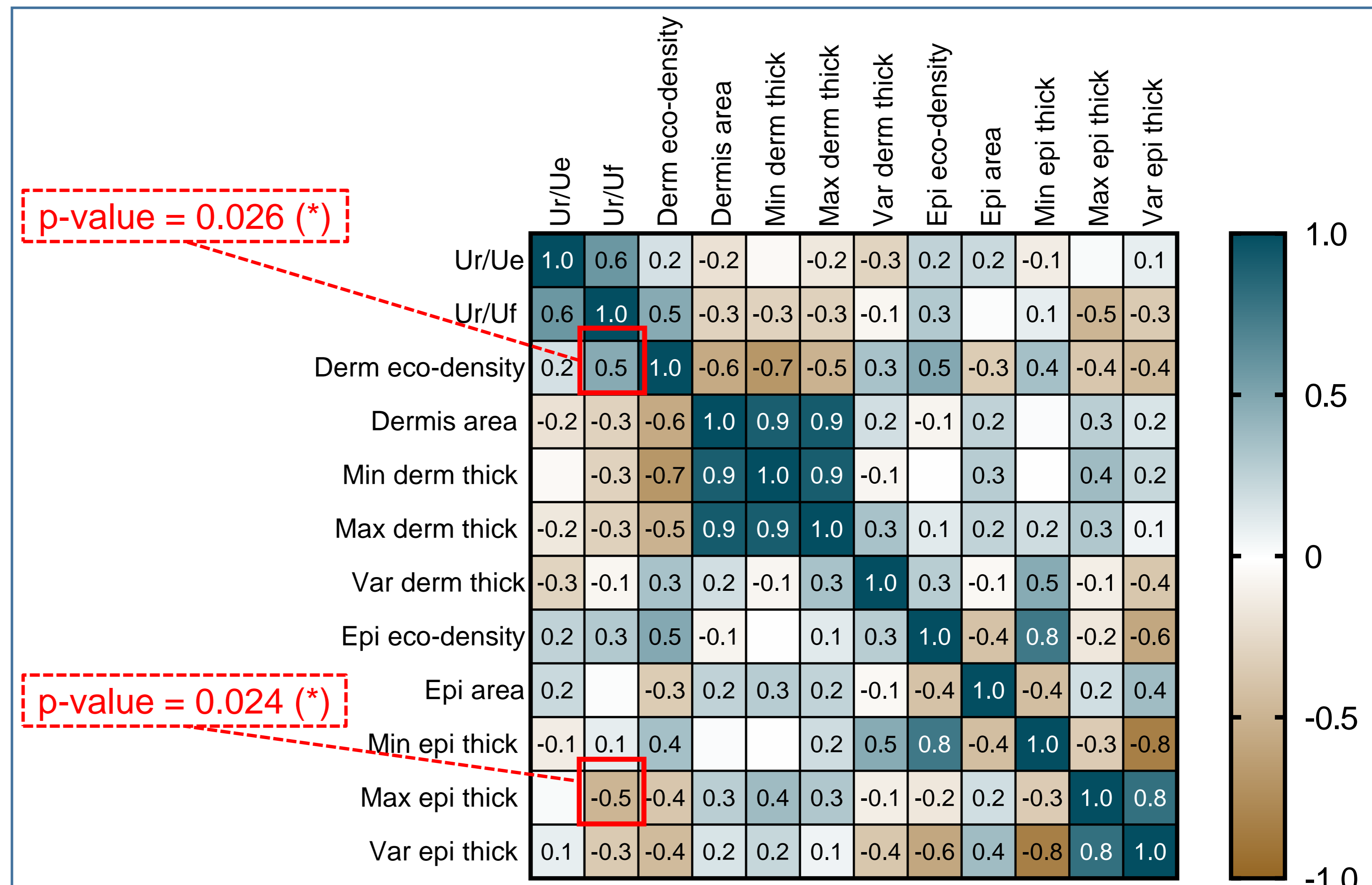p-value = 0.026 (*)

p-value = 0.024 (*)

Figure 1. Matrix of Pearson's correlation coefficients. Ur/Uf showed significant moderate correlation with dermis eco-density and moderate negative correlation with maximum epidermal thickness.
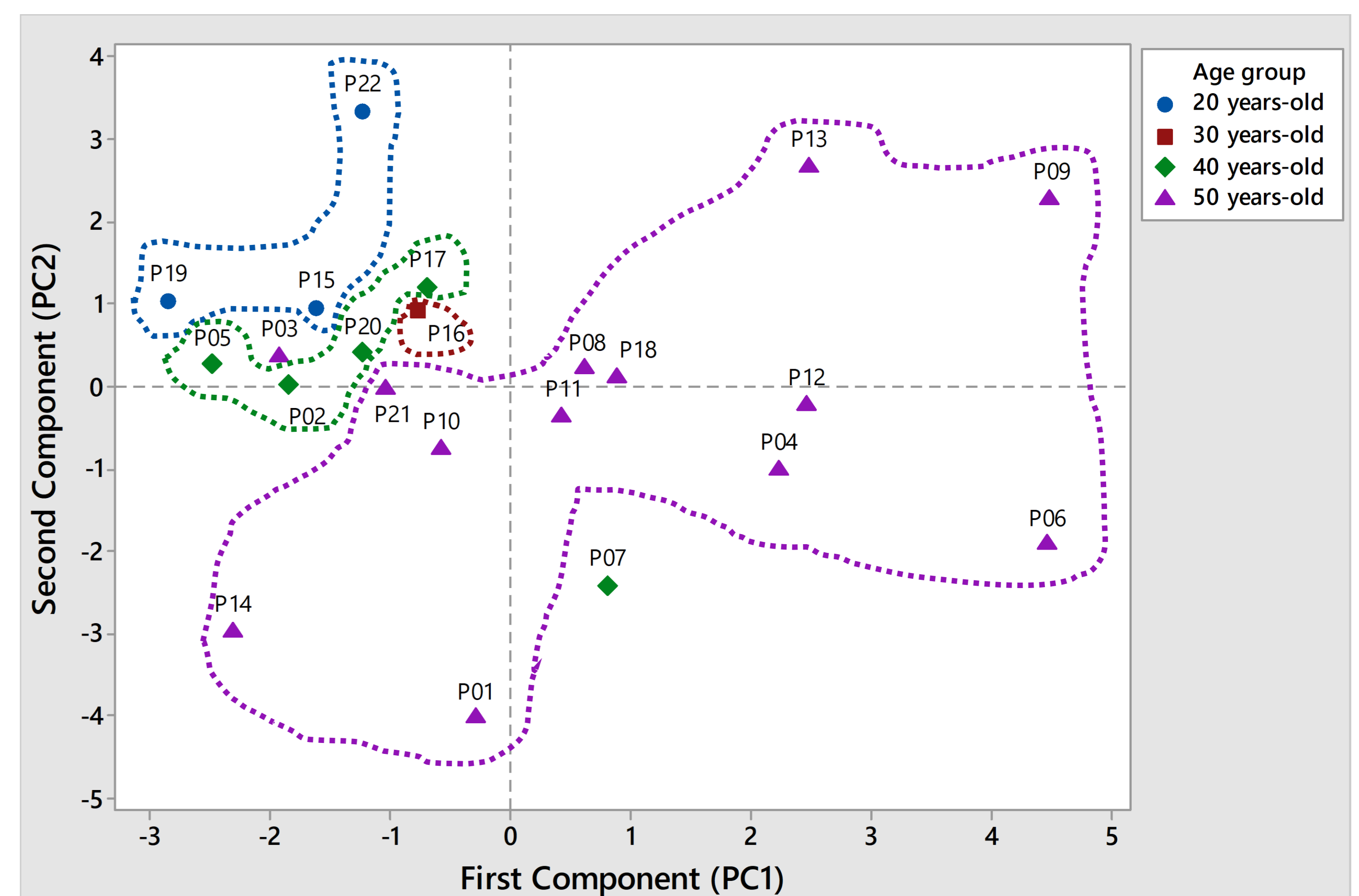

Figure 2. Scores chart on PC1xPC2 (60.4%) and the concentration of age groups in the graphic space. Loading values indicates a possible correlation between the HFUS dermis ecogenicity parameter and the Ur/Uf cutometry parameter.

Conclusions:

The eco-density parameter of the dermis correlated more strongly with the skin elasticity parameter because echogenicity allows accurate determination of the content and organization of skin collagen bundles and is widely used to assess skin aging. Our findings suggests that HFUS imaging is a reproducible powerful tool for the evaluation of the performance of dermatological and cosmetic products.

Aknowledgments:

References:

1. Vergilio MM, Monteiro e Silva SA, Jales RM, Leonardi GR. High-frequency ultrasound as a scientific tool for skin imaging analysis. Exp Dermatol. 2021;30(7):897–910.
2. Vergilio MM, Vasques LI, Leonardi GR. Characterization of skin aging through high-frequency ultrasound imaging as a technique for evaluating the effectiveness of anti-aging products and procedures: A review. Ski Res Technol. 2021;00:1–8.
3. Piérard GE. EEMCO Guidance to the in vivo Assessment of Tensile Functional Properties of the Skin. Skin Pharmacol Physiol. 1999;12(6):352–62.
4. Monteiro Rodrigues L, Fluhr JW. EEMCO Guidance for the in vivo Assessment of Biomechanical Properties of the Human Skin and Its Annexes: Revisiting Instrumentation and Test Modes. Skin Pharmacol Physiol. 2020;33(1):44–60.