

Title: Differentiation of inflammatory papulosquamous skin diseases based on skin biophysical and ultrasonographic properties: A decision tree model

Running title: decision tree of papulosquamous skin diseases

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ABSTRACT:

Introduction: The most common papulosquamous skin disorders consist of dermatitis, psoriasis, lichen planus, pityriasis rosea and parapsoriasis/mycosis fungoides, which are usually differentiated by history and histopathology as the gold standard. The biophysical and ultrasonographic properties of the skin change in these diseases.

Objective: This study was performed to identify the changes in the biophysical and ultrasonographic properties of the skin in order to differentiate these papulosquamous skin diseases.

Patients and Methods: Fifteen biophysical and ultrasonographic parameters of the skin were measured by Multi Probe Adapter System and high frequency ultrasonography in active lesions and normal control skin in patients with chronic dermatitis, psoriasis, lichen planus, pityriasis rosea, and parapsoriasis/mycosis fungoides. Using histological diagnosis as gold standard, a decision tree analysis was performed based on the mean percentage changes of these parameters $[(\text{lesion-control}/\text{control}) \times 100]$ for differentiation of the five diseases.

Results: The accuracy of the decision tree model developed based on changes in stratum corneum hydration, epidermal thickness, skin pH, melanin index, R0 (reciprocal of firmness) and erythema for differentiation of 5 diseases was 67%. Three models for differentiation of psoriasis from lichen planus, pityriasis rosea, and parapsoriasis/mycosis fungoides had high accuracy ($> 95\%$).

Conclusions: Our primary evaluation confirmed that skin biophysical and ultrasonographic properties can help in differentiation of papulosquamous diseases as a simple and non-invasive tool.

Key words: differential diagnosis, inflammatory skin diseases, biophysical properties, ultrasonographic findings