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Strategies for Hair Loss Measure

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Hair loss is a condition that affects a large part of the world's population at some point in life. This condition affects not only the appearance of an individual but also their interpersonal relationships and professional life, and can cause psychosomatic diseases and pathologies such as anxiety and depression [1,2]. Although traditionally considered a purely aesthetic concern, alopecia encompasses a significant disease burden with well-defined comorbid associations and genuine psychosocial implications [3]. Therefore, it must be evaluated and managed within an appropriate medical paradigm.

Hair loss is a common complaint in clinical dermatology. It can exist alone or in conjunction with other diseases or adaptive conditions. Several scales have been described to classify the degree of baldness [4]. Most of them cannot be applied to both men and women. The greatest difficulty in using any of these scales is the interobserver difference, which can reduce the accuracy of these methods for classifying the degree of alopecia, reducing the external validity of any studies that use it as a quantification method for research purposes. In addition, these scales measure only the capillary distribution, not taking into account morphological aspects essential for the correct diagnosis of the type of alopecia and, consequently, its prognosis [5].

Hence, there is a need for a sensitive tool to monitor hair loss [6]. Such a method must analyze different parameters (structure, number, density, diameter, and phase of the growth cycle) in various biological forms (follicular units, telogen germinal units, fibrous tracts, vellus follicles, and terminal follicles) [7].

In 1988, the diagnosis of scalp diseases was improved with the advent of digital trichoscopy [8]. This is the evolution of hair dermoscopy, which consists of acquiring images of the scalp and hair through a high definition videodermatoscope with polarized light and the ability to increase the image up to 700 times [9].

This exam provides a non-invasive diagnosis of hair problems that allows for a magnified view of the scalp, follicular ostia, and hair shafts [10]. It has as additional advantages the higher quality of the images obtained and the possibility of storing them [11]. It stands out today as an indispensable diagnostic resource for the evaluation of hair-related complaints, such as in cases of hair loss [12]. It also plays a leading role in the initial diagnosis of male and female hair loss, allowing treatment of these conditions to begin early and making treatment more effective [13].

Aiming to make the hair-loss assessment less operator-dependent, the images taken can be analyzed by computer programs using recognition algorithms, analytical studies, and artificial intelligence that accurately measure various distribution parameters, volume, and capillary density parameters [14].

This method allows for storing detailed and objective images, making it possible to reliably follow up with patients and evaluate the results of therapeutic interventions [15]. Some authors suggest that the findings of digital trichoscopy could replace more invasive examination methods, such as scalp biopsy, in most cases [12,16].

Computer programs that combine epiluminescence microscopy with automatic digital image analysis for hair morphological quantification, allowing the calculation and comparison of essential measures for measuring, diagnosing, and classifying hair loss: average number of hairs, an average thickness of hair axis, hair thickness percentage, morphological percentage of follicular units, number of empty hair follicles, cumulative hair thickness, number of follicular units, count of perifollicular signs and estimation of actual and average hair growth rates. Previous studies have shown that this type of software has high sensitivity and specificity in determining these parameters [17-20].

We are currently using the Tricho Science Pro® v1.6SE software (Trilogic LLC, Massachusetts, USA), which performs the morphological quantification of the hair allowing the calculation of 9 measurements:

1. average number of hairs
2. average thickness of the hair shaft
3. percentage of hair thickness
4. morphological rate of follicular units,
5. number of empty hair follicles
6. cumulative hair thickness
7. number of follicular units
8. count of perifollicular signs
9. estimation of actual and average hair growth rates.

Currently, these distributions, volume, and hair density data are being used as one of the numerical parameters for the quantification and classification of alopecia in our research. Results appear promising, and we intend to publish our findings soon.

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