Original Article

Classification of melasma by dermoscopy: comparative study with Wood's lamp

ABSTRACT

Introduction: Melasma is the main cause of facial hyperchromia and has a significant psychosocial impact. Wood´s lamp has been a useful device to estimate the depth of melanin determined by light-induced fluorescence. A dermoscope enables a clear visualization of pigments distribution, and the color variation of melanin will depend on its location within the skin. **Objective**: Evaluate the classification of melasma according to the depth of melanin by dermoscopy and to correlate the dermoscopic findings with its classification using Wood's lamp. **Material and methods**: Analysis of concordance between dermoscopy and Wood's lamp in the classification of melasma. Forty patients were evaluated by expert examiners independently, using a Wood's lamp (Burton® UVA 360nm LE T5 4W BLB) and dermoscopy (Bley Med-Skincam® 40x or 3Gen Dermlite II ProHR® 10x). The melasma was considered epidermal when a regular pigment network, with a brownish homogeneous pigmentation was found; it was considered dermal when an irregular and mixed network with bluish-gray pigmentation was found; and it was considered mixed when the areas show both features. **Results**: The degree of concordance between the methods was considered weak ($k < 0.2$) by statistical analysis. **Conclusions**: The authors consider the dermoscopy more suitable, since it allowed the visualization of the pigmentary components in a more objective way.

Keywords: classification, melanosis, dermoscopy.

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INTRODUCTION

Melasma is an important disease characterized by acquired hyperpigmentation and is the main cause of facial hyperpigmentation. It is a chronic condition characterized by symmetrical and asymptomatic brownish spots in sun-exposed areas. This frequent condition has a considerable influence on the quality of life of affected patients.[1,2,3,4]

Females are predominantly affected by melasma (90%), which occurs mainly during the reproductive period.[2,5] Is more prevalent in Asians and individuals of Hispanic origin, as well as in patients with skin phototypes IV to VI according to Fitzpatrick's classification, especially in residents of areas under intense ultraviolet radiation.[2,6,7,8]

Classification of melasma has significance for both prognosis and the search for appropriate therapy, since the proposed treatments are largely inadequate. This refractoriness associated with common relapses and the typical predilection for the face is a cause of dissatisfaction and significant psicossocial impact.[9,10,11]

Dermatosis is clinically classified by the lesions topographical disposition and the distribution of melanin in the skin layers through histopathological examinations and Wood's lamp.

There are basically three patterns considered on clinical examination: centrofacial, malar, and mandibular. The first is the most common and involves the malar, frontal, mentoniane, supralabial, and nasal. The second includes the malar and nasal areas, and the mandibular pattern affects the respective region. Although less common, other sites may be involved, as the neck and arms, forming an extrafacial melasma which may be associated with any of the other patterns.[2,5]

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In histopathology, the epidermal type is characterized by deposit of melanic pigment restricted to basal and suprabasal layers, occasionally extending on the epidermis until the stratum corneum; and the dermal type shows dermal pigmentation in the epidermis and the upper and middle dermis, mainly inside melanophages, often in perivascular disposition, and may also involve the deep dermis with minimal perivascular lymphocytic infiltrate in superficial dermis.[1,12]

Through Wood's lamp examination, the following types are described: epidermal - there is a color accentuation as the light is absorbed by the excess of melanin in the basal or suprabasal regions (Figures 1A and 1B); dermal – such accentuation is not noticeable (Figures 2A and 2B); mixed – as the deposit of melanin occurs in both dermis and epidermis, increased staining is seen only in a few sites (Figures 3A and 3B). Some even describe a fourth type that would be unnoticed in Wood's light, because it affects individuals of phototype V and VI. It is so named because the melanin in these patients is abundant and most of the light is absorbed by this pigment. Only a small amount returns to the eyes, and the skin appears dark as a whole.[13,14,15]

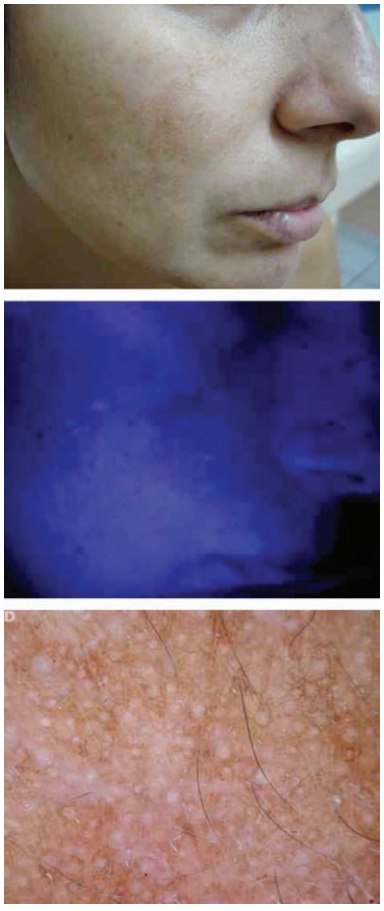

Figure 1 – Epidermal melasma. A) Clinic; B) Examination under Wood's lamp; C) Dermoscopic examination.

The study is justified due to the emotional impact and the high prevalence of hyperpigmentation. In this sense, we sought to evaluate the classification of melasma according to the depth of melanin pigment by dermoscopy, and correlate the dermoscopic findings to the Wood's lamp classification.

MATERIAL AND METHODS

Study of the correlation between dermoscopy and Wood's lamp in the classification of melasma, using the Kappa coefficient (proportion of agreement when two observers individually classify a sample).[16] All patients received instructions, read and signed informed consent, image consent, and the study was approved by the Ethics and Research Committee of *Santa Casa da Misericórdia do Rio de Janeiro*.

The protocol included information about the patient's idetification, onset of dermatosis, familial history, hormonal changes related to pregnancy and menopause, use of oral or topical medications, sun exposure, classification by clinical examination, and data were stored in the software Access®.

Patients were evaluated by an experienced examiner through Wood's lamp (UVA 360 nm Burton® LE T5 4W BLB), with melasma classified as epidermal, dermal, or mixed, according to the fluorescent light. Dermoscopic examination (videodermoscope - Bley Med-Skincam® 40x) and/or manual dermoscope (3Gen Dermlite II ProHR® II 10x) was independently performed by an experienced examiner in this method. Dermoscopic examination with videodermoscope (Bley Med-Skincam® 40x) and/or manual dermoscopy (3Gen Dermlite II ProHR® II 10x) were independently performed by an experienced examiner in this method.

At dermoscopy, we considered as epidermal type the brownish and regular pigmented network (Figure 1C); dermal type, the staining bluish gray, in which the network loses the regularity (Figure 2C); and mixed type, the presentation of areas compatible with both (Figures 3C).

RESULTS

Among the evaluated patients, 2 were male and 38 female. Their ages ranged between 26 and 69 years and skin phototypes from II to V according to Fitzpatrick scale. On clinical examination, 24 patients had centrofacial, 14 malar, 3 mandibular, and 3 extrafacial. In relation to photypes, 3 patients were phototype II, 9 patients phototype III, 17 phototype IV, and 11 phototype V.

Of the 16 lesions considered as epidermal type by dermoscopic examination, the examination agreement under Wood's lamp was 4. Of the 9 considered dermal by dermoscopy, the agreement was 2 under Wood's lamp. And of

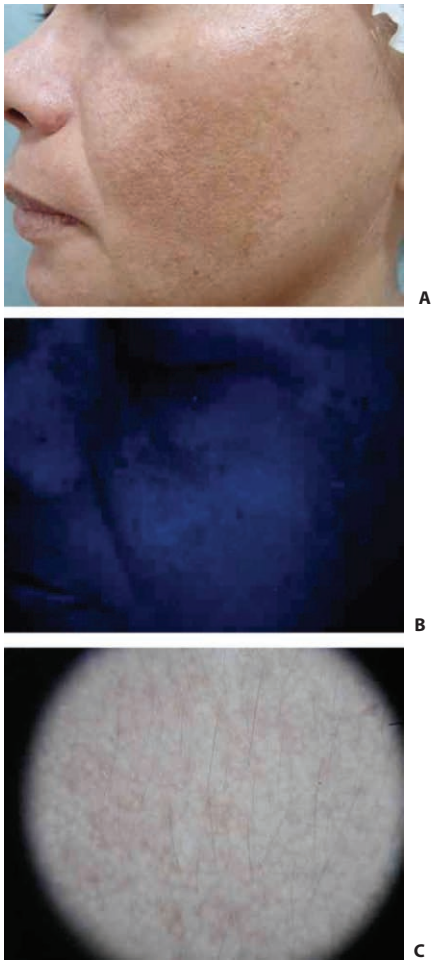

Figure 2 – Dermal melasma. A) Clinic; B) Examination under Wood's lamp; C) Dermoscopic examination.

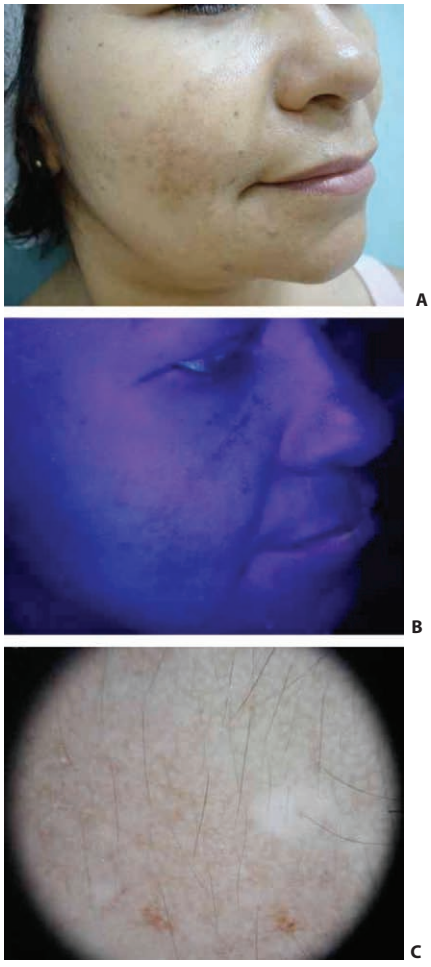

Figura 3 – Mixed melasma. A) Clinic; B) Examination under Wood's lamp; C) Dermoscopic examination.

the 15 considered mixed by dermoscopy, the agreement was 6 under Wood's lamp examination.

Seventeen patients were under treatment and 21 had never been treated, or were without treatment for at least 6 months. In agreement analysis, the methods were compared according to the classification of melasma. In epidermal melasma diagnosis, the agreement was 44% (k = -0.163 confidence interval (CI): -0.465 to 0.139). In dermal melasma, the agreement was 57% (k = -0.082; CI: -0.378 to 0.215). As for the mixed type, methods were concordant in 51% of cases (k = -0.075; CI: -0.382 to 0.231). The degree of concordance between the methods was considered weak (k < 0.2) by statistical analysis. Additionally, under dermoscopic examination, we also observed an important vascular component in most evaluated patients.

DISCUSSION

Wood's light is an ultraviolet light A of long wavelength emitted from the Wood filter, which is opaque to all radiation, except those with a wavelength between 320 and 400 nm in the ultraviolet spectrum, with peak at 365 nm.[13,14]

Wood's lamp is the most widely used method of melasma classification. A study conducted by Ponzio *et al.* (1993) to assess the instrument validity to identify the pattern of melasma, aimed to determine the cases correctly classified in 61 patients, compared with the histopathological examination. The study showed low levels of sensitivity, specificity and accuracy of the examination under Wood's lamp in the three pathological types of melasma. The results obtained in this sample concluded that "classification of melasma by examining the skin under Wood's lamp has a low proportion of correct answers, since it proved to be moderately sensitive but with low specificity, resulting in accuracy of 46%, below the expectation".[12]

Ultraviolet light from Wood's lamp penetrates predominantly in the stratum corneum and epidermis where melanin is distributed. The pigment depth will determine the fluorescence. The skin regions presenting an increase in epidermal melanin concentration will enhance their color and become darker, in contrast to the normal surrounding skin. In contrast, the areas with decreased melanin concentrations

will appear clearer and brighter. Thus, variations in epidermal pigmentation are more visible under a Wood's lamp, whereas dermal changes are much less evident or absent under the lamp compared to visible light. Less UV light reaches the dermis and this contributes much less to the fluorescence that returns to the eyes, i.e., dermal melanin does not affect the amount of light observed. Contrast between the affected and unaffected skin is considerably decreased or even unapparent compared to visible light.[17,18] Therefore, an established disadvantage is the fact that the technique will not be useful in individuals of skin type V and VI due to optical factors. Moreover, collagen and vascular changes, use of topical drugs and sunscreen can affect the test, resulting in unreliable results.[15,19,20]

There are reports that the proposed therapies are effective mainly in the epidermal type, without good results for the dermal component.[19,21,22] Some of the patients were in treatment, however this fact should not be considered a bias because the study objective is to compare methods for melasma classification, which is basically to assess the capacity and location of melanin and correlate them with the same patient.

Dermoscopy is a non-invasive technique whose realization technique is the use of optical equipment that permits a variable magnification from 6 to 400X. It is a proven reliable tool for direct visualization of other skin pigmentation. It shows predominantly the more pigmented cell clusters, depending on the amount of pigment and its depth, and the observed pigmentation derives primarily from melanin and hemoglobin in the vasculature. By examination, the color of melanin depends on the quantity, or density, and the location; going from black when localized in the stratum corneum, through shades of brown in the lower layers of the skin, to blue or bluish-gray in the dermis.[23,24,25,26]

Additionally, the method allowed observation of a vascular component in most patients. Without disregarding that topical treatments containing steroids and retinoids can induce telangiectasia, Kim EH *et al.* (2007)[27] demonstrated by immunohistochemistry a significant increase in the number and size of dermal blood vessels and reported that only the area affected by dermatosis presents pronounced vascular changes. Moreover, they consider that the number of vessels is positively related to the degree of pigmentation, which is also reported in other studies which state that the deoxyhemoglobin contributes significantly to the skin color.[27, 28,29] Kim EJ *et al.* (2005)[30] suggest an interaction between changed vasculature and melanocytes, which may influence the development of hyperpigmentation in overlying epidermis.[30]

CONCLUSION

On dermoscopic examination, it was clearly possible to observe the pigment components, as well as their position on the skin layers. The method allowed an objective classification of melasma, since the color of melanin is observed accurately through the technique and is not affected by such factors as the patient's skin phototype, vascular and collagen changes, or the use of topical products.

In the analysis of correlation between dermoscopy and Wood's lamp in dermatosis classification, the results showed significant discordance between the methods. Based on the principles of dermoscopic examination, the authors consider this method applicable, more appropriate and helpful for routine diagnosis, assessment and monitoring of patients with melasma.

Dermoscopy also allowed the observation of significant vascular component in many patients, which is consistent with reports in recent literature, and which may be relevant in terms of future prospects for pathogenesis and therapeutic considerations.

REFERENCES

1. Sanchez NP, Pathak MA, Sato S *et al.* Melasma: a clinical, light microscopic, ultrastructural, and immunofluorescence study. J Am Acad Dermatol 1981;4(6):698-710.
2. Gupta A, Gover M, Nouri K, Taylor S. The treatment of melasma: A review of clinicals trials. J Am Acad Dermatol 2006;55(6):1048-1065.
3. Pandya AG, Guevara IL. Disorders of hyperpigmentation. Dermatol Clin 2000;18: 91-98.
4. Balkrishnan R, McMichael AJ, Hu JY *et al.* Correlates of health-related quality of life in women with severe facial blemishes. Int J Dermatol 2006;45:111-115.
5. Rendon M, Berneburg M, Arellano I, Picardo M. Treatment of melasma. J Am Acad Dermatol 2006;54(5):S272-281.
6. Pandya A, Berneburg M, Ortonne J, Picardo M. Guidelines for clinical trials melasma. Br J Dermatol 2007;156(suppl. 1):21-28.
7. Grimes PE. Melasma. Etiologic and therapeutic considerations. Arch Dermatol 1995; 131:1453-1457.
8. Hexsel D, Arellano I, Rendon M. Ethnic considerations in the treatment of Hispanic and latin-american patients with hyperpigmentation. Br J Dermatol 2007;156 (suppl.1):7-12.
9. Balkrishnan R, McMichael AJ, Camacho FT *et al.* Development and validation of a health-related quality of life instrument for women with melasma. Br J Dermatol 2003; 149(3):572-577.
10. Cestari TF, Hexsel D, Viegas ML *et al.* Validation of a melasma quality of life questionnarre for brazilian portuguese language. Br J Dermatol 2007;156(suppl.1):13-20.
11. Pawaskar MD, Parikh P, Markowski T *et al.* Melasma and its impact on health-related quality of life in Hispanic women. J Dermatolog Treat 2007;18(1):5-9.
12. Ponzio HA, Cruz MF. Acurácia do exame sob a lâmpada de Wood na classificação dos cloasmas. An Bras Dermatol 1993;68:325-328.
13. Asawonda P, Taylor CR. Wood´s light in dermatology. Int J Dermatol 1999; 38:801-807.
14. Gilchrest BA, Fitzpatrick TB, Anderson RR, Parrish JA. Localization of malanin pigmentation in the skin with Woods lamp. Br J Dermatol 1977;96(3):245-248.
15. Anderson RR, Parrish JA. The optics of human skin. J Invest Dermatol. 1981;77 (1):13-9.
16. López L, Pita S. Medidas de concordancia: el índice de Kappa. Cad Aten Primaria 1999;6:169-171.
17. Edwards EA, Duntley SQ. The pigment and color of human skin. Am J Anat 1939; 65:1-33.
18. Edwards EA, Finklestein NA, Duntley SQ. Spectrophotometry of Living Human Skin in the Ultraviolet Range. J Invest Dermatol. 1951;16(5):311-321.
19. Freedberg IM, Elsen AZ, Wolff K, Austen KF, Goldsmith LA, Katz SI. Fitzpatrick's Dermatology in General Medicine. 5. ed. McGraw-Hill, 1995.
20. Ortonne JP, Passeron T. Melanin Pigmentary disorders: treatment update. Dermatol Clin 2005;23:209-226.

21. Azulay RD, Azulay DR, Azulay-Abulafia L. Dermatologia. 5. ed. Guanabara Koogan, 2008.
22. Hantash BM, Mahmood MB. Fractional photothermolysis: A novel aesthetic laser surgery modality. Dermatol Surg 2007;33:525-534.
23. Braun RP, Rabinovitz HS, Oliviero M *et al.* Dermoscopy of pigmented skin lesions. J Am Acad Dermatol 2005;52:109-121.
24. Weismann K, Lorentzen H. Dermoscopic color perspective. Arch Dermatol 2006; 142:1250.
25. Piccolo D, Fargnoli C, Ferrara G *et al.* Hypoepiluminescence microscopy of pigmented skin lesions: new approach to improve recognition of dermoscopic structures. Dermatol Surg 2006;32:1391-97.
26. Ferreira CM, Barcaui CB, Piñeiro-Maceira J. Dermatoscopia – Aplicação Clínica e Correlação Histopatológica. 1. ed. Atheneu, 2004.
27. Kim EH, Kim YC, Lee ES, Kang HY. The vascular characteristics of melasma. J Dermatol Sci 2007;46(2):111-116.
28. Baranoski G, Krishnaswamy A. An introduction to light interaction with human skin. RITA. 2004;11:33-62
29. Stamatas GN, Kollias N. Blood stasis contributions to the perception of skin pigmentation. J Biomed Opt 2004;9(2):315-322.
30. Kim EJ, Park HY, Yaar M, Gilchrest BA. Modulation of vasendothelial growth factor receptors in melanocytes. Exp Dermatol. 2005;14:625-633.