Comparison of Dermoscope and Woods Lamp as A Tool to Study Melanin Depth in Melasma

Abstract

Introduction: Melasma is a common acquired disorder of pigmentation that presents as hyperpigmented macules and patches predominately in the sun exposed areas of the face. It is more commonly seen in women. Objective: To compare the woods lamp and dermoscopic features of melasma. Materials and Methods: A total of 50 patients were enrolled in this cross-sectional analytical study in a tertiary care hospital setting for over a duration of 3 months. Melasma was clinically classified as centrofacial, malar and mandibular and the patients were then examined using the woods lamp (Dermaindia) and dermoscope (Dermlite DL4). Patients were classified into epidermal, mixed, and dermal melasma based on the level of melanin pigment. Statistical analysis was done using IBM SPSS software (version 22) to find the Cohen’s kappa coefficient. (The degree of agreement between different methods of assessment/different observers.) Results: The level of agreement between the two methods was done with the help of Kappa coefficient. The Cohen’s kappa coefficient was 0.534 with a \( P = 0.00 \) (\( p < 0.05 \)), which indicated a moderate strength of agreement.

Conclusion: Among the two diagnostic tools, there was a moderate degree of agreement between dermoscopy and woods lamp in the analysis of melasma. Limitations: Both woods lamp and dermoscopy are tools that are subjective in nature. There was a lack of comparison with histopathology or newer diagnostic techniques like reflectance confocal microscopy (RCM).

Keywords: Depth of pigment, dermoscopy, melasma, woods lamp

Introduction

Melasma, previously referred to the term chloasma, is an acquired disorder of hypermelanosisis, most commonly seen in females and predominantly affecting the face. The clinical presentation is most often in the form of hyperpigmented patches over the face in three common patterns: Centrofacial, malar and mandibular.\(^{(1)}\)

Evaluating the depth of pigment in a case of melasma is a useful guide to the treatment plan and also for counselling the patients regarding level of expectations from the treatment.

The number of studies available in dermatology literature portraying the correlation between wood’s lamp and dermoscopic findings with regard to melasma are scant. Therefore, the present study was undertaken to correlate and compare the findings of woods lamp and dermoscope for melasma.

Materials and Methods

A cross-sectional analytical study was performed in a tertiary care hospital setting in Goa. A total of 50 patients were enrolled in the study over a duration of 3 months after taking informed written consent after ethical committee approval. A detailed demographic profile and thorough clinical history with details such as the duration, risk factors, and history of treatment received were taken.

This was followed by a complete dermatological examination and all findings and information was documented. Clinical photographs were taken using Nikkon DSLR 5300. The participants were classified according to the clinical pattern of melasma into centrofacial, malar and mandibular subtypes. They were then subjected to examination by the Woods lamp and Dermoscope.

The participants were classified into epidermal, dermal and mixed pattern of melasma based on the amount of

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enhancement noted by the woods lamp. It was classified as epidermal when enhancement was noticed, dermal when there was no enhancement and mixed when there was a slight enhancement noted.

A Dermlite DL4 dermoscope was utilized in the study. The color of melanin as well as the intensity and the pattern of pigment network was used to identify the location of pigment. Through the dermoscope the visualization of black and dark brown to light brown color with a regular well defined pigment network was classified as epidermal while the presence of bluish or bluish grey color with an irregular ill-defined pigment network was classified as dermal while combination was classified as mixed.

The statistical analysis was performed using the IBM Statistical Package for the Social Sciences software (SPSS version 22) to compute the Cohens kappa coefficient (which assesses the degree of agreement between two different methods/observers) assuming the values to significant when \( P < 0.05 \).

**Results**

There were 50 participants in the study. Mean age of the patients was 43 years with range between 25 to 64 years. Females outnumbered males in the study with 39 (78%) females and 11 (22%) male participants.

The most common pattern of melasma was the centrofacial pattern found in 25 (50%) cases followed by malar with 21 (42%) cases while only 4 (8%) cases were of the mandibular type.

Distribution of cases according to depth of melasma using woods lamp and dermoscope is tabulated in table 1.

The clinical photographs of cases with corresponding woods lamp and dermoscopic images are depicted in Figure 1a-c.

Through the Woods lamp, 24 (48%) of the cases were identified as of the epidermal subtype, 20 (40%) were of the mixed type and 6 (12%) of the cases were dermal. Through the dermoscope, 15 (30%) cases were of the epidermal, 23 (46%) were of mixed type and dermal were 12 (24%).

The level of agreement between the two methods was done with the help of Kappa coefficient. The Cohens kappa coefficient was 0.534. The strength of agreement is considered to be moderate with \( P = 0.00 \) (p < 0.05).

Various dermoscopic findings that were observed are tabulated in the Table 2.

Reticuloglobular pattern was the pattern observed in all cases. While the epidermal subtype had predominately black and dark brown color of the pigment, dermal had grey and greyish blue color while mixed had a combination. All cases had a follicular and appendageal sparing.

**Discussion**

Melasma is a very common acquired disorder of hyperpigmentation characterized by the presence of symmetrical light to dark brown macules most commonly on the face and occasionally over neck and forearms.

Woods lamp is one of the oldest diagnostic tools in melasma which is based on the principle of fluorescence. Dermoscopy is a relatively recent device used for the diagnosis and classification of types of melasma. Although the standard diagnostic test to assess the depth of melanin pigment is biopsy for histopathological study, it is not feasible in all patients due to its invasiveness and also inability to dynamically monitor skin changes

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**Table 1: Comparison of classification of melasma depth by Woods Lamp and Dermoscopy**

| Classification of melasma by woods lamp | Classification of melasma by dermoscopy | Kappa coefficient |
|----------------------------------------|----------------------------------------|------------------|
| Epidermal                              | Epidermal                              | 0.534            |
| Mixed                                  | Mixed                                  |                  |
| Dermal                                 | Dermal                                 |                  |
| Total                                  | Total                                  | 12               |

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**Table 2.**

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due to the impossibility of evaluating the same area over time and inflammatory effects occurring in wound healing. Newer methods like the RCM (reflectance confocal microscopy) can also be used for evaluating the melanin depth in melasma.\cite{2} With the help of Wood's light findings, Sanchez \textit{et al}.\cite{3} classified melasma into four subtypes: Epidermal, dermal, mixed and Wood's light inapparent.

The Wood’s lamp examination done in our patients revealed epidermal pattern as the most common followed by mixed and dermal patterns. While the percentage of epidermal cases were similar to studies in the past,\cite{4,5} our study showed a higher proportion of mixed melasma and a lesser percentage of dermal cases.

Wood’s lamp evaluation is however limited to be applicable only for the lighter skin types and not suitable for type V or VI Fitzpatrick skin types.\cite{6}

Newer studies propose that the woods lamp examination is less specific and dermal melanin is unrecognized by this method.\cite{7} A study was performed by Ponzio \textit{et al}.\cite{8} to ascertain the instrument validity of a woods lamp to identify the pattern of melasma, aimed to estimate the cases correctly classified as compared with the histopathological examination in 61 patients. The study showed low levels of sensitivity, specificity and accuracy of the examination under Wood’s lamp in the three pathological types of melasma.

In addition use of topical sunscreens, topical drugs, collagen and vascular changes may affect the outcomes of a woods lamp examination.\cite{9}

Dermoscopy allows for a more objective classification for melasma as it eliminates the interference by confounding factors such as vascular/collagen changes, topical agents etc.\cite{10}

Dermoscopy additionally also allows the visualization of the vascular component in melasma.

In the present study, mixed variety (46%) was the most common pattern followed by epidermal (30%) and dermal (24%) on dermoscopy. While the proportion of epidermal melasma was similar to other studies\cite{1,4} our study had a higher percentage of mixed melasma cases and a slightly lesser proportion of dermal cases.

A recent \textit{in vivo} RCM (reflectance confocal microscopy) study depicted a heterogenous dispersal of melanophages between different sites of melasma. This heterogenous dispersal of melanophages was apparent within different foci of individual lesions of melasma. These observations question the existence of “true epidermal” or “true dermal” types of melasma and suggest that all melasma are therefore mixed.\cite{9} Our study showed a higher percentage of mixed melasma cases both by Wood's lamp and dermoscope, as compared to similar studies done in the past which therefore indicates a high level of inter-individual variation in assessment either through woods lamp or dermoscope.

There was moderate level of agreement between the two methods of assessment of depth [Cohens kappa coefficient- 0.534] Manjunath \textit{et al}.\cite{4} and Dharni \textit{et al}.\cite{7} reported a kappa coefficient of 0.833 in their respective studies which indicated substantial level of agreement.

While Tamler \textit{et al}.\cite{1} reported a kappa coefficient of <0.2 indicating a weak level of agreement.

**Limitations**

Newer diagnostic tools indicate that the mixed pattern of melasma appears to be present in all cases when analyzed with respect to the depth of pigmentation. Though our study also showed mixed pattern as the most common variant but not in all cases. This may be due to the factors like the analyzed image, subjective technique and interpretation, lack of comparison with histopathology or new diagnostic techniques like RCM.

**Conclusion**

Among the two diagnostic tools, there was a moderate degree of agreement between dermoscopy and Wood's lamp in the analysis of melasma. Although the study is not intended to indicate the better tool of assessment of melasma depth amongst the two, we found that dermoscopy aided in identifying mixed pattern of melasma to a better extent which is corroborating with newer diagnostic tools.

### Table 2: Various Dermoscopic findings in melasma in our study

| Dermoscopic feature          | Epidermal melasma | Mixed melasma | Dermal melasma |
|------------------------------|-------------------|---------------|---------------|
| Reticuloglobular pattern     | ++ (73.33\%)      | ++ (74\%)     | ++ (75\%)     |
| Homogeneous                  | ++ (67\%)         | + (21.79\%)   | + (50\%)      |
| Brown, dark brown            | ++ (100\%)        | + (100\%)     | + (66.6\%)    |
| Black                        | + (26.6\%)        | -             | -             |
| Grey                         | -                 | ++ (85\%)     | ++ (100\%)    |
| Granular pattern             | -                 | + (43.4\%) (predominately brown granules) | + (41.6\%) (predominately grey granules) |
| Arcuate, honey comb, moth eaten patterns | - | + (predominately brown) | + (predominately grey) |
| Perifollicular pigmentation  | -                 | + (56.5\%)    | + (83.33\%)   |
Declarations of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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