Original Research Article

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Clinico-dermoscopic evaluation of cervico-facial melanosis with histopathological correlation

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ABSTRACT

Background: Cervico-facial melanosis, due to their visibility are a frequent cause of dermatologic consultation causing significant cosmetic and psychosocial burden. For successful treatment, diagnosis of the facial melanosis is important. Combining different modalities like dermoscopy and histopathology helps in better management of these disorders. Aim of the study was to study the clinical profile of cervico-facial melanosis and evaluate them with a dermoscope and to correlate histopathological findings with clinical and dermoscopic findings.

Methods: Study was conducted from July 2022 to December 2023. 50 patients suffering from cervico-facial hypermelanosis were enrolled. Complete clinical evaluation with detailed history and physical examination was done. All patients underwent skin biopsy and dermoscopic evaluation.

Results: In the present study all patients fulfilling the inclusion and exclusion criteria and willing for biopsy were only enrolled, the most common diagnosis being lichen planus-pigmentosus (LPP) in 18(36%) patients, ashy dermatosis (AD) in 15(30%), postinflammatory hyperpigmentation (PIH) in 6(12%), acanthosis nigricans (AN) in 4 (8%), Riehls melanosis (RM) in 3 (6%), melasma in 2 (4%), nevus of ota (NOO) in 1 (2%), macular amyloidosis (MA) in 1 (2%) patient.

Conclusions: Hyperpigmentary disorders have often shown that Clinical examination alone can misdiagnose certain conditions. Hence this study reinforces that the dermoscope proves to be a valuable tool in diagnosis, prognosis, and follow up of disorders of cervico-facial hyperpigmentation in conjunction with HPE for confirmation and effective management of these cases.

Keywords: Cervico-facial hypermelanosis, Dermoscopy, Histopathology

INTRODUCTION

The face serves as a central component of an individual's physical identity, which is why cervico-facial melanosis often prompts dermatologic evaluation. Facial hypermelanosis encompasses a broad spectrum of disorders that frequently exhibit overlapping clinical characteristics, making accurate diagnosis challenging and necessitating more advanced diagnostic tools. In the Indian population, conditions leading to

hyperpigmentation are significantly more prevalent than those resulting in hypopigmentation.² A variety of factors may contribute to hyperpigmented lesions affecting either the epidermis or dermis, including genetic predisposition, hormonal imbalances, nutritional deficiencies, neoplastic conditions, inflammatory responses, medications, and exposure to physical or chemical agents.³ Dermoscopy has emerged as a valuable, non-invasive tool that enhances the clinician's ability to detect subtle patterns and improve the diagnostic accuracy of facial melanosis

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METHODS

Study was conducted from July 2022 to December 2023 in Raja Rajeshwari medical college and hospital. This was a cohort study. A total of 50 clinically diagnosed patients with hyperpigmentation over face and neck presenting to the outpatient department fulfilling the inclusion criteria were enrolled in the study. Ethical approval for the study was obtained from the ethics committee of the institution [RRMCH-IEC -XX3-XX22].

Inclusion criteria

Both male and female patients diagnosed with cervicofacial melanosis, age group between 18-70 years and patients consenting to the study were included.

Exclusion criteria

Patients with cervico-facial melanosis on any form of topical and systemic treatment in the past 4 weeks and pPregnant women were excluded.

A comprehensive history of all the patients was noted in terms of age of onset, progress, duration of disease, site of onset of pigmentation, and associated symptoms. History was taken regarding confounding factors like usage of cosmetics or hair dyes, any drug intake prior to onset, similar past or family history. Then detailed local cutaneous examination was conducted to see the morphology of lesions, level of involvement, and colour of pigmentation. And all the patients that are included in our present study underwent the following investigations: Dermoscopic examination and skin biopsy for histopathological examination.

Dermoscopic examination

Dermlite DL3N dermatoscope (3Gen, Inc. 31521 Rancho Viejo Road, Suite 104 San Juan Capistrano, CA 92675, USA) and magnification of 10× was used. The lesion site was identified, cleaned, and studied under the dermoscope.

Histopathological examination

After a written consent was obtained, Site of the biopsy was selected and prepared. Local anaesthesia consisting of 2% lidocaine with/without epinephrine was given. Punch biopsy was done from the selected site using a

punch of size 2.5 mm. Biopsy specimen was sent in 10% formalin. Special stains were used when necessary.

Statistical analysis

The results were tabulated and analysed statistically using SPSS Software 17.0 version. For comparing and finding correlation between different variables, Chi square test is used respectively. Results were only considered to be significant if value of probability p was less than 0.05.

RESULTS

During the course of our study the most commonly encountered facial melanosis in our OPD was melasma but majority of patients were not willing for biopsy hence only woods lamp with dermoscopy was performed and we could only enroll few cases with biopsy in our study. Similarly, few cases of Freckles, Ochronosis, TSDF, Lentigines, seborrheic melanosis and periorbital melanosis were examined. In the present study all patients fulfilling the inclusion and exclusion criteria and willing for investigations were only enrolled, the most common diagnosis being LPP in 18 (36%) patients, AD in 15 (30%), PIH in 6 (12%), AN in 4 (8%), RM in 3 (6%), melasma in 2 (4%), NOO in 1(2%), MA in 1 (2%) patient. The various dermoscopic and histopathological findings were presented in the Tables 1 and 2.

Dermoscopic findings in the present study, dark brown pigment was noted to be seen most commonly with LPP, AD, PIH and AN, while light brown was noted only in LPP and PIH. Blue-grey was consistently noted with LPP, AD and NOO. Arcuate, annular and dotted patterns were noted most commonly in LPP, AD, PIH. Hem-like pattern was seen only in LPP 10 (55.5%), while in AD, curvilinear pattern was seen on dermoscopy and formed by pigment granules. Perifollicular involvement was seen in all the cases. Dotted was seen in all except melasma, peri-eccrine involvement was seen in all except MA.

Histopathological findings in the present study, an increased basal layer melanin, perivascular infiltrate, and melanophages were seen in all cases. Hyperkeratosis was seen in all etiologies except in PIH. Most of the etiologies of hypermelanosis have epidermal thinning and diffuse dermal infiltrates. Hypergranulosis was noted only in LPP. Rete ridges pointed is seen in LPP and AN. Amyloid deposition was only seen in MA. Correlation of histopathological findings with dermoscopy is in Table 3.

Table 1: Various dermoscopic findings in the participants with melanosis.

Dermoscopic findings		Melasma	LPP	AD	PIH	AN	NOO	MA	RM
		n=2 (%)	n=18 (%)	n=15 (%)	n=6 (%)	n=4 (%)	n=1 (%)	n=1 (%)	n=3 (%)
	Dark brown	1 (50)	8 (44.4)	4 (26.6)	3 (42.8)	3 (75.0)	0	1 (100)	3 (100)
Color of	Light brown	0	2 (11.1)	0	3 (42.8)	0	0	0	0
pigment	Blue-grey	0	6 (33.3)	11 (73.3)	0	0	1 (100)	0	0
	Mixed	1 (50)	2 (11.1)	0	1 (14.2)	1 (25.0)	0	0	0

Continued.

Dermoscopic findings		Melasma n=2 (%)	LPP n=18 (%)	AD n=15 (%)	PIH n=6 (%)	AN n=4 (%)	NOO n=1 (%)	MA n=1 (%)	RM n=3 (%)
Symmetry	Homogenous	1 (50)	6 (33.3)	10 (66.6)	2 (28.5)	1 (25.0)	0	0	0
of pigment	Heterogenous	1 (50)	12 (66.6)	5 (33.3)	5 (71.4)	3 (75.0)	1 (100)	1 (100)	3 (100)
	Reticulo- globular	1 (50)	0	0	3 (42.8)	0	0	0	0
	Accentuated pseudoret-icular	1 (50)	0	4 (26.6)	4 (57.1)	0	1 (100)	0	3 (100)
	Arcuate	0	13 (72.2)	12 (80.0)	3 (42.8)	0	0	1 (100)	0
	Annular	0	12 (66.6)	9 (60.0)	3 (42.8)	0	1 (100)	0	0
	Dotted	0	7 (38.8)	15 (100)	1 (14.2)	4 (100)	1 (100)	1 (100)	3 (100)
	Hem-like pattern	0	10 (55.5)	0	0	0	0	0	0
	Curvilinear pattern	0	0	5 (33.3)	0	0	0	0	0
Patterns of	White structures	0	6 (33.3)	12 (80.0)	1 (14.2)	0	0	0	3 (100)
pigment	Crista cutis and sulcus cutis	0	0	0	0	3 (75.0)	0	0	0
	Spoke and hub	0	0	0	0	0	1 (100)	0	
	Milia-like cysts	0	0	0	0	1 (25.0)	0	0	0
	Perifollicular involvement	1 (50)	15 (83.3)	9 (60.0)	6 (85.7)	1 (25.0)	1 (100)	1 (100)	3 (100)
	Perieccrine involvement	1 (50)	17 (94.4)	15 (100)	3 (42.8)	4 (100)	1 (100)	0	3 (100)
	Visible vascular structures	1 (50)	2 (11.1)	0	4 (57.1)	0	0	0	3 (100)

Table 2: Various histopathological findings in the participants with melanosis.

	Melasma	LPP	AD	PIH	AN	NOO	MA	RM
Histopathological findings	n=2	n=18	n=15	n=6	n=4	n=1	n=1	n=3
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Hyperkeratosis	1 (50)	7 (38.8)	11 (73.3)	0	4 (100)	1 (100)	1 (100)	3 (100)
Epidermal thinning (focal)	2 (100)	13 (72.2)	6 (40)	4 (57.1)	0	0	1 (100)	3 (100)
Hypergranulosis	0	5 (27.7)	0	0	0	0	0	0
Rete ridges pointed	0	5 (27.7)	0	0	1 (25.0)	0	0	0
Rete ridges flat	1 (50)	0	0	6 (100)	0	0	0	1 (33.3)
Acanthosis	0	4 (22.2)	4 (26.6)	0	4 (100)	0	0	0
Papillomatosis	0	0	0	0	4 (100)	0	0	0
Increased melanin throughout epidermis	2 (100)	0	0	4 (57.1)	0	0	0	0
Increased basal layer melanin	2 (100)	14 (77.7)	5 (33.3)	6 (100)	2 (50)	1 (100)	1 (100)	3 (100)
Basal layer vacuolization	1 (50)	18 (100)	9 (60.0)	0	1 (25)	0	0	3 (100)
Follicular plugging	0	0	4 (26.6)	0	0	0	0	1 (33.3)
Melanophages	1 (50)	18 (100)	1 5(100)	6 (100)	4 (100)	1 (100)	1 (100)	3 (100)
Amyloid deposition	0	0	0	0	0	0	1 (100)	0
Fibroplasia	0	0	4 (26.6)	6 (100)	0	0	0	0
Civatte bodies	0	2 (11.1)	4 (26.6)	0	0	0	0	0
Band-like dermal infiltrate	0	15 (83.3)	4 (26.6)	0	0	0	0	1 (33.3)
Diffuse dermal infiltrate	1 (50)	18 (100)	11 (73.3)	6 (100)	0	1 (100)	1 (100)	3 (100)
Perivascular infiltrate	2 (100)	18 (100)	11 (73.3)	6 (100)	4 (100)	1 (100)	1 (100)	3 (100)

Table 3: Commonly correlating dermoscopic features.

S. no.	Dermoscopic findings (present in patients/total no. of patients)				
1	Melasma, (n=2)				
	Reticuloglobular pattern (1/2)				
	Accentuated pseudoreticular network (1/2)				
2	LPP, (n=18)				
	Arcuate structures (13/18)				
	Hem-like pattern (10/18)				
	Annular structures (12/18)				
3	AD, (n=15)				
	White structures (12/15)				
	Dotted pattern (15/15)				
4	PIH, (n=6)				
	Reticuloglobular pattern (3/6)				
	Dotted pattern (1/6)				
5	AN, (n=4)				
	Dotted pattern (4/4)				
	Crista cutis, sulcus cutis (3/4)				
	Milia-like cysts (1/4)				
6	NOO, (n=1)				
	Dotted pattern (1/1)				
	Annular pattern (1/1)				
7	MA, (n=1)				
	Spoke and hub pattern (1/1)				
	Dotted pattern (1/1)				
8	RM, (n=3)				
	White structures (3/3)				
	Dotted pattern (3/3)				

Table 4: Differences between LPP and AD.

Features	LPP, (n=18)	AD, (n=15)
Sites involved commonly	Face, neck (photoexposed)	Face
Pruritus	80%	0%
Color of pigmentation	Brown (55.5%), blue-grey (33.3%)	Dark brown (26.6%), blue-grey (73.3%)
Symmetry	33.3%	66.6%
Oral mucosal involvement	Nil	Nil
Epidermal hyperkeratosis	38.8%	73.3%
Epidermal atrophy	72.2%	80%
Vacuolar degeneration of basal layer	100%	60%



Figure 1: LPP-clinical image.

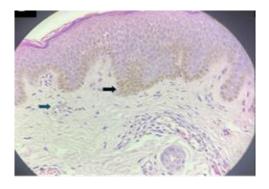


Figure 2: LPP-histopathology image showing increased basal layer pigmentation (black arrow), dermal melanophages (blue arrow).

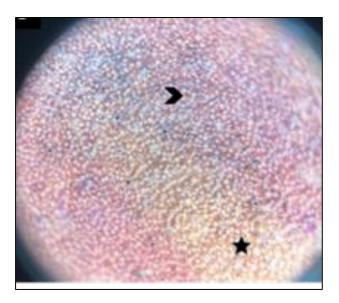


Figure 3: LPP-dermoscopy image showing annular structure (arrow head), hemlike structures (star).



Figure 4: Ashy's dermatosis-clinical image.

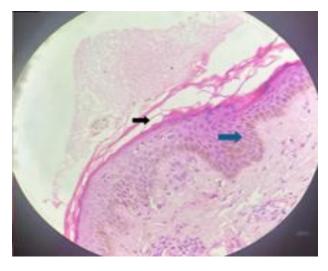


Figure 5: Ashy's dermatosis-histopathological image showing hyperkeratosis (black arrow), dermal melanophages (blue arrow).

DISCUSSION

Accurate diagnosis of facial hypermelanosis is crucial not only for appropriate clinical management but also to alleviate the psychosocial impact on affected individuals.⁴ Beyond standard clinical examination, the use of dermoscopy-a non-invasive, *in vivo* diagnostic tool-has become increasingly important.

In our study, the mean age of participants was 39.32±12.12 years, with the majority falling within the 31-40-year age group. This is consistent with findings from Amatya et al where the mean age was 34.04±13.17 years (range: 13-86 years), and most subjects (72.5%) were between 21-40 years of age. In our cohort, females constituted 80% (40 out of 50) of the study population. Similarly, Amatya et al reported a female predominance (71.6%).⁶ Shahana et al also observed a female-to-male ratio of 4:1, which matches our findings.⁷

Regarding lesion distribution, 62% of patients (31/50) had pigmentation confined to the face, while 24% (12/50) had involvement of both face and neck. Cheeks were the most commonly affected site (50%), followed by the forehead (26%). All participants had some degree of sun exposure. Additional contributing factors included oil application (54%), hair dye use (36%), and cosmetic use (34%). These trends align with findings reported by Kaur et al and Hassan et al.^{5,8}

Histopathology and dermoscopy findings

LPP

In cases diagnosed as LPP, histopathological examination revealed increased basal layer melanin in 77.7% (14/18) and dermal melanophages in all patients. Dermoscopic patterns included hem-like pigmentation in 55.5% of patients, arcuate pigment patterns in 72.2%, and annular pigment deposition in 66.6%. Representative features of LPP are shown in Figures 1-3.

Small pigment granules observed dermoscopically corresponded with dermal melanophages noted histologically. Key dermoscopic features included pseudonetworks, dotted pigmentation, arcuate patterns, and telangiectasias, consistent with observations by Pirmez et al. Kanwar et al also documented basal layer vacuolization in 78.5% and dermal melanophages in 63% of LPP cases. 10

A hallmark dermoscopic sign of LPP is the sparing of eccrine and follicular white dots. Unlike classic lichen planus, Wickham striae and vascular features are generally absent. The presence of large brown dots and globules is attributed to superficial melanin deposits in the dermis caused by inflammation at the dermoepidermal junction. Due to the follicular orientation of pathology in LPP, pigment globules often appear as semicircular, arcuate, or hem-like structures.

AD

Histopathology in AD cases showed melanophages in all patients (100%) and hyperkeratosis in 60%. Dermoscopically, dotted pigment deposition was seen in all patients, with a curvilinear pattern in 33.3% and white structures in 80% of cases (Figures 4 and 5).

Gray and brown globules arranged in irregular linear or broken patterns have also been described by Elmas et al. 11 Vinay et al coined terms like "broken lines" and "Chinese letter" patterns to describe these features. 12 On dermoscopy, AD often presents with bluish-gray to brown globules, mild erythema, and linear vessels. Compared to LPP, the pigment globules in AD appear smaller and less prominent due to deeper placement and preserved rete ridges.

Importantly, follicular involvement, a hallmark in LPP, is absent in AD. Thus, the pigment globules in AD exhibit a more scattered or speckled distribution. Comparative features distinguishing LPP and AD (EDP) are summarized in Table 4.

NOO

In our study, dermoscopic examination of NOO revealed both annular and dotted pigment deposition patterns. Pigment appeared as irregular blotches, consistent with the observations of Nischal et al.¹³ Elmas et al also described common features such as brown and gray structureless areas arranged in a patchy distribution, along with distinct white clods arranged in a "four-dot" pattern.¹⁴ El-Kadiri et al reported similar findings, including blue-gray structureless zones with iridescent reflections and white rosettes.¹⁵ These features can be attributed to the presence of deeply located melanocytes and melanophages within the dermis, which, due to the Tyndall effect, impart the characteristic blue-gray hue of the lesion.

Melasma

Among melasma cases in our study, dermoscopy revealed two distinct pigment patterns: one patient exhibited a reticuloglobular pattern, while the other demonstrated an accentuated pseudoreticular pattern. Histologically, both cases showed increased melanin in the basal layer along with flattened rete ridges. These findings are in alignment with the study by Neema et al where the pseudoreticular network was the most prevalent dermoscopic pattern in melasma, followed by the reticuloglobular type. ¹⁶

PIH

In PIH cases, dermoscopic findings included a reticuloglobular pigment deposition pattern in 42.8% (3/7) of patients and a dotted pattern in 14.2% (1/7). Amatya et al described similar features, including reddish-brown homogeneous pigmentation on a red background and a dark brown reticular or homogeneous

pattern with scattered dark brown dots.⁶ Chatterjee et al noted that dermoscopy of PIH may show inconsistent pigment patterns.¹⁷ Histopathological examination by Shah et al reported preserved epidermal architecture, increased epidermal melanin and melanocytes, pigment incontinence, and mild lymphocytic infiltration.¹⁸

AN

Histopathology in AN cases revealed consistent findings of melanophages, papillomatosis, and acanthosis in all patients. Dermoscopically, 75% of patients showed characteristic crista cutis and sulcus cutis pigmentation patterns. Chatterjee et al similarly described epidermal pigmentary incontinence, thickening, interface alterations, and lymphocytic infiltrates.¹⁷ Dermoscopy typically shows linear pigmented ridges (crista cutis) and pale grooves (sulcus cutis), with the latter appearing hypopigmented due to basket-weave stratum corneum in the valleys. According to Shah et al hyperpigmented dots within crista cutis and linear structures are common dermoscopic features in AN.19

MA

In cases of MA, a distinctive "spoke-and-hub" dermoscopic pattern was observed. The central hub correlates with amyloid deposits and melanophages at the tips of dermal papillae, while the radiating spokes reflect irregular melanin deposits in the basal layer caused by reactive hyperplasia. Amyloid deposition confined to the papillary dermis was exclusively seen in these cases, corroborating the findings of Sathyanarayana et al.²⁰

Riehl's melanosis

Dermoscopy of Riehl's melanosis showed an accentuated pseudoreticular pigment pattern in all patients. Wang et al. reported pseudonetworks, gray dots, and telangiectatic vessels in 100% of cases. Additionally, follicular plugs and perifollicular white structures were seen in approximately 46.7% of cases, aligning closely with observations from our study.²¹

Limitations

Limited sample size

The study involved only 50 participants, which may not adequately represent the broader population affected by cervico-facial melanosis. A larger cohort would enhance the statistical strength and improve the generalizability of the findings.

Single-center design

As the research was conducted at a single institution, the results may reflect regional or demographic patterns that are not applicable to other populations. Multi-center studies would offer a more diverse perspective.

Participant selection bias

Only individuals who consented to undergo skin biopsy were included in the study. This may have led to the exclusion of patients with less severe symptoms or those unwilling to participate in invasive procedures, potentially skewing the results.

CONCLUSION

Cervico-facial melanosis, due to their visibility are a frequent cause of dermatologic consultation causing significant cosmetic and psychosocial burden. In the present study dermoscopic findings are correlated with the gold standard histopathology. Hence, a thorough clinical, dermoscopic and histopathological examination is required in early and accurate diagnosis of various cervico-facial melanosis, which is prerequisite for effective management, thereby helping in improving patients' quality of life. This study reinforces that dermoscope proves to be a valuable tool in diagnosis, prognosis, and follow up of disorders of cervico-facial hyperpigmentation in conjunction with HPE for confirmation and effective management of these cases.

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