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Original Research Paper

Pathology

A CLINICOPATHOLOGICAL STUDY OF PIGMENTED (MELANOCYTIC AND NON-MELANOCYTIC) SKIN LESIONS WITH SPECIAL REFERENCE TO SOME RARE ENTITIES

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ABSTRACT **Background and Aim:** Pigmented skin lesions, ranging from benign to malignant, are clinically and histopathologically diverse, requiring accurate categorization for effective management. This study aims to analyze the histomorphological patterns of various pigmented skin lesions, focusing on distinguishing between melanocytic and non-melanocytic types, with a particular emphasis on identifying rare and diagnostically challenging entities. **Methodology:** A retrospective clinicopathological study was conducted at the Department of Pathology, Gandhi Medical College, Bhopal, from 2022-2023. Out of 200 skin biopsy cases, 35 pigmented lesions were examined. Data on age, gender, lesion location, and clinical history were recorded. Histopathological evaluation involved hematoxylin and eosin (H&E) staining, supplemented by special stains as needed. Lesions were categorized as melanocytic or non-melanocytic, and descriptive statistics were used for analysis. **Results:** Of the 35 cases, 28.5% were melanocytic, while 71.5% were non-melanocytic. Melanocytic lesions were more prevalent in males and younger individuals (<21 years), commonly appearing on sun-exposed areas such as the cheeks. Non-melanocytic lesions showed a higher occurrence in females and spanned a broader age range, predominantly affecting areas like the palms and back. Clinical-histopathological concordance was 60%, with higher consistency in melanocytic lesions (70%) compared to non-melanocytic (56%). **Conclusion:** This study underscores the importance of histopathological analysis in accurately diagnosing pigmented skin lesions.

KEYWORDS : Pigmented skin lesions, Melanocytic, Non-melanocytic, Histopathology, Clinico pathological correlation.

INTRODUCTION

Human skin colour, a characteristic largely determined by the distribution and concentration of pigments in the epidermis and dermis, plays a significant role in both physiological and pathological conditions. (1–3) Melanin, a complex polymer synthesized by melanocytes in the epidermis, is the primary determinant of skin colour. Its production, transfer to keratinocytes, and eventual degradation is a complex process regulated by various genetic, hormonal, and environmental factors. (2,4) Aside from melanin, other pigments, such as bilirubin and beta-carotene, contribute minorly to skin tone and pigmentation. (5,6) Pathologically, pigmentation disorders arise when there are abnormalities in melanin synthesis, transport, or breakdown, leading to conditions that manifest as pigmented lesions. Pigmented skin lesions are a diverse group of skin conditions characterized by shades ranging from black, brown, and blue, and can vary from benign to malignant. (7,8) Clinically, these lesions are often divided into melanocytic and non-melanocytic types based on their origin. (7,8) Melanocytic lesions arise from melanocyte proliferations, which include three cell types—melanocytes, nevus cells, and melanoma cells—found predominantly in the epidermis and dermis, and occasionally in the subcutaneous layer. Non-melanocytic lesions, on the other hand, encompass a variety of cell types including keratinocytes, vascular structures, or reactive cellular processes. Melanocytic lesions include conditions such as benign nevi (moles), dysplastic nevi, and malignant melanoma, each with distinct histopathological features that aid in diagnosis and prognostication. Non-melanocytic pigmented lesions include seborrheic keratosis, basal cell carcinoma, actinic keratosis, dermatofibrosarcoma protuberans, lichen planus pigmentosus, and vasoformative lesions. A critical aspect of diagnosing pigmented lesions involves histopathological analysis, which not only aids in distinguishing benign from malignant conditions but also provides insight into the lesion's cellular origin and behaviour. (7) This study aims to analyze the histomorphological patterns of various pigmented skin lesions, focusing on distinguishing between melanocytic and non-melanocytic types, with a particular emphasis on identifying rare and diagnostically challenging entities. These rare lesions, though infrequent, underscore the diversity of pigmented lesions and highlight the importance of accurate histopathological identification in guiding clinical management and prognosis.

Methodology

This study is a retrospective clinicopathological analysis conducted at the Department of Pathology, Gandhi Medical College, Bhopal, over two years (2022-2023) after approval from the Institutional Ethics Committee.

Out of 200 cases of skin lesions processed in the pathology department during the study period, 35 cases were identified as pigmented lesions based on clinical and histopathological examination. Only cases presenting with clinically pigmented lesions (black, brown, or blue in colour) were included. Exclusion criteria involved cases with insufficient or incomplete biopsy samples, lesions not associated with pigment, and recurrent or treated lesions. Information on each patient's age, gender, clinical history, lesion location, and any associated symptoms was recorded. The collected specimens

were initially examined for size, colour, and surface characteristics. Sections were prepared from formalin-fixed, paraffin-embedded tissue samples and stained with hematoxylin and eosin (H&E). Special stains, such as Fontana-Masson, were used in cases where further differentiation of melanin pigment was required. Each lesion was categorized as melanocytic or non-melanocytic based on histopathological features.

Descriptive statistics were applied to summarize the findings, with frequencies and percentages used for categorical data.

RESULTS

The study comprised a total of 200 skin biopsy cases, of which 35 (17.5%) were identified as pigmented lesions. Table 1 illustrates the distribution of these pigmented lesions by subtype, with melanocytic lesions accounting for 10 cases (28.5%) and non-melanocytic lesions comprising 25 cases (71.5%). Within the melanocytic category, types such as malignant melanoma, Becker's nevus, and blue cell nevus were observed, while rare entities, including reticular pigmentary disorder and congenital intradermal nevus, were also documented. Among the non-melanocytic lesions, the most frequently encountered were lichen planus and post-inflammatory hyperpigmentation. Additionally, rare non-melanocytic lesions such as ashy dermatosis and steatocystoma multiplex were identified. The lesions have been depicted in Images 1(a, b and c) and 2 (a, b, c, d, e and f). Table 2 provides a breakdown of these lesions by gender, age group and site. The majority of melanocytic lesions were more common in males, with a distribution of 6 cases in males versus 4 cases in females. In contrast, non-melanocytic lesions showed a female predominance, with 20 cases in females and only 5 in males. Age analysis showed that melanocytic lesions predominantly appeared in individuals under 21 years, whereas non-melanocytic lesions spanned a broader age range, with higher incidence in the 21-30 years age group. Anatomically, melanocytic lesions were most frequently located on the cheek, whereas non-melanocytic lesions were commonly seen on the palm. Table 3 details the clinical and histopathological correlation findings. A clinical-histological consistency was achieved in 7 out of 10 melanocytic cases and 14 out of 25 non-melanocytic cases. In total, 21 out of 35 cases (60%) showed consistency between clinical diagnosis and histopathological findings, emphasizing the critical role of histopathology in verifying clinical assessments, particularly in complex or rare pigmented lesions.

Table 1: Distribution of Melanocytic and Non-Melanocytic Pigmented Skin Lesions by Subtype

Lesion type	Subtype	Cases (n)
Melanocytic	Malignant Melanoma	1
	Becker's Nevus	1
	Dermal Nevus	1
	Blue Cell Nevus	2
	Chondroid Nevus	1
	Compound Nevus	1
	Nevus Sebaceous	1
	Reticular Pigmentary Disorder	1
	Congenital Intradermal Nevus	1
Total		10
Non-melanocytic	Basal Cell Carcinoma	2
	Post-Inflammatory Hyperpigmentation	4
	Lichen Planus	7
	Fibroepithelial Polyp	2
	Steatocystoma Multiplex	1
	Discoid Lupus Erythematosus	1
	Ashy Dermatosis	1
	Lichen Planus Pemphigoid	1
	Pityriasis Rosea	1
	Bowen Disease	1
	Pityriasis Lichenoides Chronica	1
	Seborrheic Keratosis	2
	Sebaceoma	1
Total		25

Table 2: Gender, Age Group and Site wise Distribution of Melanocytic and Non-Melanocytic Pigmented Skin Lesions

Variables	Melanocytic	Non-melanocytic
Gender		
Male	6	5
Female	4	20
Age group		
<21 years	6	4
21-30 years	3	5
31-40 years	0	4
41-50 years	1	4
51-60 years	0	4
61-70 years	0	3
>70 years	0	1
Site of Skin Lesion		
Forehead	2	1
Ala of nose	0	2
Cheek	3	1
Temporal area	0	3
Scalp	1	3
Neck	0	2
Palm	0	5
Back	1	0
Shoulder	0	0
Leg	1	3
Sole	1	2
Genitals	1	0
Whole body (generalized)	0	3
Total	10	25

Table 3: Clinical and Histopathological Correlation in Melanocytic and Non-Melanocytic Pigmented Skin Lesions

Consistency with Clinical Diagnosis	Melanocytic Lesions (n)	Non-melanocytic Lesions (n)	Total (n)
Consistent with clinical diagnosis	7	14	21
Inconsistent with clinical diagnosis	3	11	14
Total	10	25	35

Histopathological Images

Image 1(a), (b) and (c): Pigmented Melanocytic Lesions

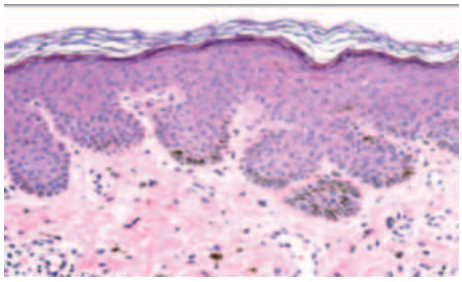

Image 1(a): Reticulate Pigmentary Disorder

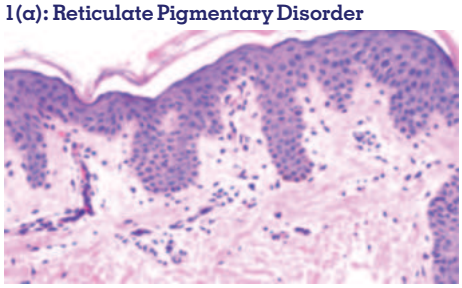

Image 1(b): Becker's Nevus

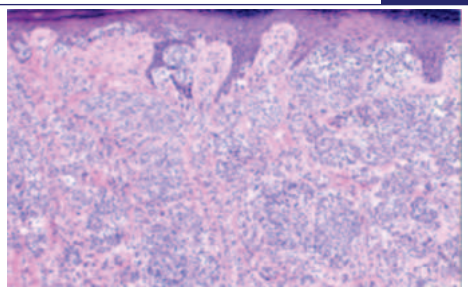

Image 1(c): Chondroid Nevus (Spit 2 type)

Image 2(a), (b), (c), (d), (e) and (f): Non-Melanocytic Lesions

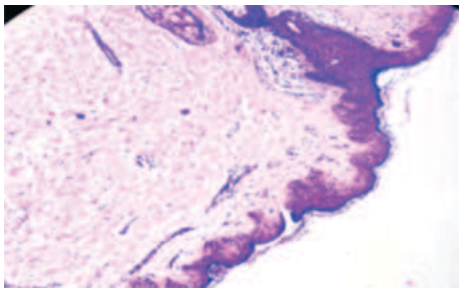

Image 2(a): Ashy Dermatosis

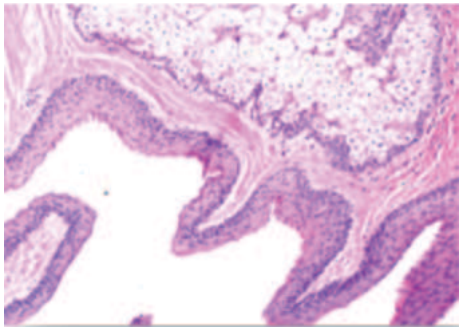

Image 2(b): Steatocystoma Multiplex

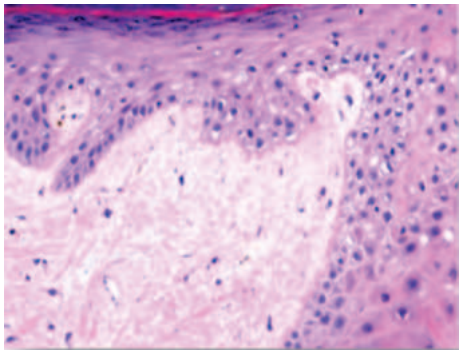

Image 2(c): Discoid Lupus Erythematosus

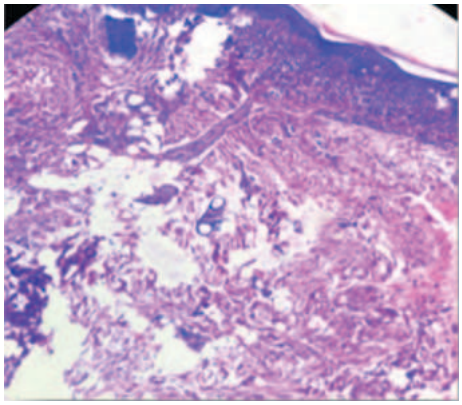

Image 2(d): Lichen Planus Pemphigoid

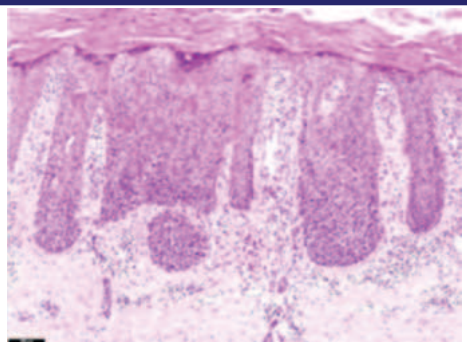

Image 2(e): Bowen disease

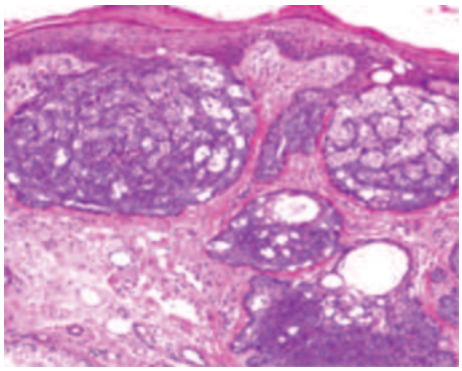

Image 2(f): Sebaceoma

DISCUSSION

This study examined the histopathological characteristics of melanocytic and non-melanocytic pigmented skin lesions. The results of this study show a greater prevalence of non-melanocytic lesions (71.5%) compared to melanocytic lesions (28.5%). This trend aligns with findings of Singh A et al (7) where non-melanocytic lesions were frequently encountered (69.4%) and melanocytic lesions comprised 30.6% of the patients. Additionally, research by Anand I et al. (9) and Suvernakar SV et al. (10) indicated a notable predominance of non-melanocytic lesions at 69% and 56.8%, respectively, supporting the current study's findings. However, Bohra et al. (2019) (11) reported contrasting results, with melanocytic lesions more prevalent at 69.6%.

Gender-specific analysis in this study revealed a male predominance for melanocytic lesions (60%), whereas non-melanocytic lesions were significantly more common in females (80%). This pattern resonates with findings of Singh A et al (7) which observed a higher incidence of non-melanocytic lesions in females (70.5%). Conversely, Parvathi M et al (8) found melanocytic lesions to be more prevalent in females (61.3%) and non-melanocytic lesions more common in males (61.5%). Suvernakar SV et al (10) also reported an overall female preponderance for pigmented skin lesions. Anand I et al (9) reported a more balanced distribution of pigmented lesions between genders, highlighting potential differences in sample characteristics or study settings. These variations suggest that gender-based differences in the prevalence of pigmented lesions may be influenced by demographic, genetic, and environmental factors.

The age distribution in present study highlighted that melanocytic lesions were more frequent in individuals under 21 years, consistent with the developmental nature of benign melanocytic nevi, which typically appear in childhood and early adulthood. Non-melanocytic lesions, associated with various reactive and environmental factors, were observed across a broader age range, peaking in the 21-30- and 31-40-year groups. This distribution support findings of Singh A et al (7), where melanocytic lesions were most common in younger age groups (21-30 years), while non-melanocytic lesions were

predominant in individuals aged 31-50 years. However, Parvathi M et al (8) reported more melanocytic lesions in the 31-40 age group, while non-melanocytic lesions were more prevalent in <21 years age group, showcasing some variation in age-based prevalence. Suvernakar SV et al (10) reported that all lesions were more common in the 61-80 years age group except benign melanocytic nevi which was common in the 21-40 years age group (66.67%). This variability in age-based prevalence across studies could be because age-related factors, including cumulative environmental exposure and genetic predisposition, play a significant role in the distribution of pigmented skin lesions.

The anatomical distribution of these lesions, in the present study, further supports the diversity in their pathogenesis. Melanocytic lesions were most commonly found on sun-exposed areas such as the cheeks, suggesting a possible role of UV exposure in their development or presentation. Non-melanocytic lesions, on the other hand, were frequently observed on areas such as the palms and back, indicating that factors unrelated to UV exposure, such as trauma, pressure, or systemic conditions, may contribute to pigmentary changes in these locations. Singh A et al (7) reported similar findings, identifying the head, face, abdomen, and back as the most common sites for melanocytic lesions, while noting a variable distribution for non-melanocytic lesions. Parvathi M et al (8) also found that the face was the predominant site for melanocytic lesions (81.8%), whereas non-melanocytic lesions showed varied distribution across the scalp, trunk, and extremities. Laishram RS et al (12) further supported these findings, reporting that the face was the most common site for pigmented lesions (51.4%), followed by the upper and lower extremities. These observations collectively indicate that UV exposure plays a significant role in the anatomical presentation of melanocytic lesions, while non-melanocytic lesions are influenced by a broader array of environmental and systemic factors.

The diagnostic concordance between clinical impressions and histopathological findings highlights the inherent challenges in clinically distinguishing between different pigmented lesions. In this study, a clinical-histological agreement was achieved in 60% of cases, with a higher consistency rate observed for melanocytic lesions (70%) compared to non-melanocytic lesions (56%). The relatively high rate of diagnostic inconsistency in non-melanocytic lesions can be attributed to their varied and often overlapping clinical presentations, which can mimic those of melanocytic lesions or other dermatological conditions. Conditions such as ashy dermatosis or lichen planus pemphigoides, for instance, may present with pigmentation patterns that resemble benign or malignant melanocytic lesions, emphasizing the necessity of histopathological confirmation for an accurate diagnosis. This finding underscores the importance of histopathological analysis in the differential diagnosis of pigmented lesions, particularly when clinical features alone may result in diagnostic ambiguity. Supporting this study's outcomes, Singh A et al (7) reported a 73.3% overall clinical-histological consistency. Parvathi M et al (8) found even higher concordance, with 79.16% of melanocytic lesions and 65% of non-melanocytic lesions aligning with clinical impressions. Bohra I et al (11) highlighted a significant disparity between lesion types, reporting a 75% consistency rate for melanocytic lesions but only 14.3% for non-melanocytic lesions. Suvernakar SV et al (10) observed high consistency rates for both lesion types, noting 84.21% for melanocytic lesions and 88% for non-melanocytic lesions. These variations across studies point to the complex nature of diagnosing pigmented lesions and reinforce the critical role of thorough histopathological examination to confirm clinical diagnoses, particularly for non-melanocytic lesions with atypical or overlapping presentations.

Additionally, the identification of rare entities within both melanocytic and non-melanocytic categories, such as congenital intradermal nevus and steatocystoma multiplex, underscores the value of routine histopathological examination. These rare lesions, though infrequent, are clinically significant due to their potential to mimic more common pigmented lesions, posing a risk of misdiagnosis. Histopathological features, including cellular composition, pigment distribution, and architectural patterns, are crucial in differentiating these rare entities from more prevalent lesions, thereby aiding in accurate diagnosis and appropriate management.

CONCLUSION

This study provides valuable insights into the clinico-pathological characteristics of melanocytic and non-melanocytic pigmented skin lesions. The findings emphasize the need for a multidisciplinary approach involving both clinical and histopathological assessment to improve diagnostic accuracy, particularly for rare or atypical pigmented lesions. Further studies with larger sample sizes could provide additional data on the demographic and clinical patterns associated with specific lesion types, potentially aiding in the development of guidelines for the management of pigmented skin lesions in clinical practice.

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