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Original Research Article

Clinico-Epidemiological Spectrum of Pigmentary Disorders among Patients Attending a Dermatology Outpatient Department

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Abstract:

Background: Pigmentary disorders, including hyperpigmentation, hypopigmentation, and depigmentation, are common dermatological conditions with significant psychosocial impact. Their prevalence and clinical patterns vary across populations, with limited data available from Indian outpatient settings.

Aim: To evaluate the clinico-epidemiological spectrum of pigmentary disorders among patients attending a dermatology outpatient department.

Methodology: A hospital-based cross-sectional study was conducted over eight months at the Dermatology OPD of Bhagwan Mahavir Institute of Medical Sciences, Bihar, India. A total of 80 patients of all ages presenting with pigmentary disorders were enrolled consecutively. Detailed socio-demographic and clinical data were collected using a semi-structured proforma. Clinical diagnoses were made based on history, dermatological examination, and investigations where necessary. Data were analyzed using SPSS, with categorical variables expressed as frequencies and percentages.

Results: The mean age was 34.8 ± 10.6 years, with females predominating (62.5%). Homemakers (35%) and individuals with high sun exposure were common. Melasma (32.5%) was the most prevalent disorder, followed by post-inflammatory hyperpigmentation (22.5%) and vitiligo (20%). The face was the most commonly affected site across all conditions.

Conclusion: Pigmentary disorders are prevalent among young to middle-aged adults, especially females, with melasma being the most common. Facial involvement underscores the psychosocial impact, highlighting the need for early diagnosis and tailored management strategies.

Keywords: Pigmentary disorders, Melasma, Post-inflammatory hyperpigmentation, Vitiligo, Dermatology outpatient, Epidemiology.

Introduction

Pigmentary disorders refer to a broad range of dermatological conditions in which there is an abnormal pigmentation of the skin, which occur in millions of individuals globally and constitute a major healthcare burden [1]. Such disorders can be hyperpigmented, hypopigmented or depigmented, caused by a change in the production of melanin, its distribution or the functioning of melanocytes. Despite the fact that in many cases they are seen as mere cosmetic issues, pigmentary disorders are in many cases deep-seated both in terms of medical, psychological, and social implications. These conditions are even more applicable in the countries when there is diversity in skin phototypes and high levels of sun exposure, as it is in India, where the conditions are visible, chronic, and may affect the quality of life.

The many varieties of pigmentary disorders that are common in the Indian population have distinct clinical expressions, epidemiological characteristics, and etiology [2]. Differences in genotype predisposition, Fitzpatrick skin types (mostly IV-VI), weather conditions, and environmental exposures help in the formation of unique pattern of disease as compared to western populations. Moreover, the delay in seeking healthcare behavior, the widespread use of topical agents with over-the-counter drugs, and cosmetic use, can change the morphology and progression of the disease. Although the pigmentary disorders have a significant role in the quality of life and psychosocial welfare of the individuals, the knowledge about them in the Indian context is quite low, which requires additional research and description.

The Indian subcontinent is a diverse community with different genetic backgrounds, culture and environmental exposures, and this heterogeneity forms part of a complicated interaction of factors affecting pigmentary disorders [3]. Genetic susceptibility is interplayed with ultraviolet radiation, hormonal factors, nutrition, occupational exposures, frictional dermatoses, inflammatory skin diseases and use patterns of cosmetics to predict disease expression. Moreover, the sociocultural understanding of the skin color and beauty standards has a tremendous influence on psychosocial well-being of the people, which increases the importance of pigmentary disorders among this group of people [4]. Hyper pigmentary conditions can bring social stigma, low self-esteem, marriage issues and isolating oneself in a society where light tone of skin is highly regarded socially. On the other hand, depigmenting diseases like vitiligo can also be accompanied by misconceptions, discrimination, and mental trauma.

Nevertheless, the available information on pigmentary disorders is mostly based on the studies made on majority Caucasian people, which might not provide significant details on the specifics in the pigmentary disorder of people of Indian origin [5]. The variation in skin biology, melanosome structure, reaction to ultraviolet radiation, and post-inflammatory pigmentary alterations restrict the generalizability of the Western data to the Indian environments. In addition, the trends in presentation, access to healthcare and treatment preference also differ significantly. Consequently, a strong desire exists to have region-specific clinico-epidemiological information that can be used to inform contextually relevant management interventions.

It is important to note that pigmentary disorders in India have a broad range of disorders, such as melasma, post-inflammatory hyperpigmentation, vitiligo, and other types of hypopigmentation [6] to name a few. Symmetrically hyperpigmented macules on sun-exposed skin are a feature of melasma which is especially prevalent in women of reproductive age and is usually linked with hormonal effects and UV radiation. Post-inflammatory hyperpigmentation is a second common appearance, which occurs as a secondary effect of acne, dermatitis, infections, or trauma and is more chronic in darker skin phototypes. Vitiligo is an acquired depigmenting illness caused by the destruction of melanocytes and has serious psychosocial morbidity in the Indian setting. Additional hypopigmentary conditions such as pityriasis alba, idiopathic guttate hypomelanosis and chemical leukoderma continue to add to the clinical heterogeneity experienced in outpatient dermatology clinics.

Not only do they create certain diagnostic and therapeutic challenges but also have implications for long-term management and prognosis. Clinical assessment, dermoscopy, as well as sometimes histopathological verification might be required to distinguish between different causes of hyperpigmentation or hypopigmentation. The slow nature of therapeutic responses and their variability are prone to a lengthy period of treatment and patient counseling. Besides, the inadequate administration of topical corticosteroids and depigmenting agents may cause detrimental effects, such as steroid-induced dermatoses and exogenous ochronosis hence making the clinical picture less straightforward.

The urgent need to clarify the epidemiology, risk factors, and the treatment outcome of some pigmentary disorders (like melasma) in the Indian population is due to the high prevalence of this pigmentary disorder [7] among the Indians. The trends in diseases may be affected further by the rapid urbanization, the growth of sun exposure at work, environmental pollution, and the alteration of cosmetic practices. There are also hormonal causes such as pregnancy and taking oral contraceptives that cause diseases to women. However, complete epidemiological information that describes these relationships in the actual outpatient context are illusive.

Although pigmentary disorders have been recognized as an important issue of concern in the general population in India, there are still major gaps in the clinical presentation, natural history, and the most effective management protocols of the condition [8]. Numerous available studies have small sample sizes, concentrating on individual diseases, or are not based on systematical data collection. Also, little has been mentioned about the relative prevalence of various pigmentary disorders in standard dermatology outpatient clinics that are the initial contact with most of the patients. A cross-sectional evaluation of the patients with pigmentary complaints may be used as a valuable source of information about current trends, demographic area, and other factors.

Moreover, healthcare inequality in access and use can widen the burden of pigmentary disorders in the vulnerable populations and such groups require specific interventions and allocation of resources [9]. There can be the effect of socioeconomic status, education level, gender norms, and geographic location on health-seeking behavior, treatment compliance, and disease outcomes. These contextual determinants are crucial determinants to comprehend in order to come up with fair healthcare policies and culturally sensitive patient education initiatives [10].

Considering the latter, the current cross-sectional study will perform a thorough characterization of the clinico-epidemiological spectrum of pigmentary disorders in patients visiting a dermatology outpatient department of an urban tertiary teaching hospital. This study aims to produce an in-depth epidemiological picture of pigmentary conditions as described by a systematic assessment of the incidence and distribution of different pigmentary conditions

as they occur in everyday clinical practice. Demographic features of age, gender distribution, illness period, and possible precipitating or aggravating factors are given particular focus.

The research will record clinical trends and morphological variations of pigmentary disorders experienced in the outpatient population. Recognizing the patterns of disease progression, frequently involved anatomical sites, and comorbid dermatological conditions will help improve the accuracy of the diagnosis and help treat the condition with a more personal approach. The cross-section design enables the measurement of the various conditions at the same time thus giving a comprehensive picture of pigmentary disorders, as opposed to an individual entity.

Methodology

Study Design: This study was a hospital-based cross-sectional observational study conducted to assess the clinico-epidemiological spectrum of pigmentary disorders among patients attending the Dermatology Outpatient Department (OPD). The design was chosen to evaluate the distribution, clinical patterns, and associated epidemiological factors of pigmentary disorders at a single point over a defined study period without follow-up.

Study Area: The study was carried out in the Department of Skin and VD at Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

Study Duration: The study was conducted over a period of eight months from February 2025 to September 2025.

Sample Size: A total of 80 patients diagnosed with pigmentary disorders were included in the study. The sample consisted of consecutive patients who met the inclusion criteria and consented to participate during the study period.

Study Population: The study population comprised patients of all age groups and both genders presenting with pigmentary disorders at the Dermatology OPD during the study period. These patients represented diverse socio-demographic backgrounds, enabling assessment of the clinical and epidemiological spectrum of pigmentary conditions in this region.

Data Collection: Data were collected using a predesigned and pre-tested semi-structured proforma. After obtaining informed consent, detailed socio-demographic information such as age, gender, occupation, residence, and socioeconomic status was recorded. A thorough clinical history was obtained, including duration of lesions, onset, progression, distribution, history of sun exposure, family history of pigmentary disorders, drug intake (including oral contraceptive pills), and use of cosmetic or skin-lightening products. A comprehensive dermatological examination was conducted to assess the type of pigmentary disorder, morphology, color, size, pattern, and extent of lesions, along with any associated cutaneous or systemic findings. Relevant laboratory investigations and dermoscopic evaluation were performed when necessary to confirm the diagnosis.

Inclusion Criteria

- Patients of all age groups and both sexes presenting with pigmentary disorders.
- Patients who provided written informed consent to participate in the study.
- In case of minors, consent obtained from parents or legal guardians.

Exclusion Criteria

- Patients who were unwilling to provide informed consent.
- Patients with critically ill conditions where detailed dermatological examination was not feasible.
- Patients with incomplete clinical data.

Procedure: All patients attending the Dermatology OPD during the study period were screened for pigmentary disorders. Eligible patients fulfilling the inclusion criteria were enrolled consecutively until the sample size of 80 was reached. Clinical diagnosis was established based on detailed history and thorough dermatological examination. The collected data were systematically recorded and subsequently entered into a Microsoft Excel spreadsheet for organization and analysis.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) software, version 17.0 or the latest available version. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation. The normality of data distribution was assessed prior to analysis. Associations between categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. Continuous variables were compared using the independent (unpaired) t-test. A p-value of less than 0.05 was considered statistically significant."

Result

Table 1 summarizes the demographic profile of the study population (N = 80). The mean age was 34.8 ± 10.6 years, ranging from 10 to 68 years. Age distribution showed that 10 patients (12.5%) were ≤20 years, 40 patients (50%) were 21–40 years, 24 patients (30%) were 41–60 years, and 6 patients (7.5%) were >60 years. Females predominated with 50 participants (62.5%) compared to 30 males (37.5%). Regarding occupation, 28 patients (35%) were homemakers, 20 (25%) were farmers or laborers, 18 (22.5%) were students or unemployed, and 14 (17.5%) were engaged in service or business. The

average daily sunlight exposure was 4.6 ± 1.5 hours. Overall, the study population was relatively young, predominantly female, with homemakers forming the largest occupational group.

Table 1: Summary of demographic profile of the study population		
Demographic characteristic	**Frequency (n = 80)**	**Percentage (%)**
Age (Years)		
Mean ± SD	34.8 ± 10.6	
Range	10–68	
Age Group (Years)		
≤20	10	12.5
21–40	40	50
41–60	24	30
>60	6	7.5
Gender		
Female	50	62.5
Male	30	37.5
Occupation		
Homemakers	28	35
Farmers/Laborers	20	25
Students/Unemployed	18	22.5
Service/Business	14	17.5
Duration of Sunlight Exposure (hours/day)	4.6 ± 1.5	

Table 2 presents the prevalence of pigmentary disorders among 80 patients. Melasma was the most common disorder, affecting 26 patients (32.5%), followed by post-inflammatory hyperpigmentation in 18 patients (22.5%) and vitiligo in 16 patients (20%). Pityriasis alba was observed in 10 patients (12.5%), lichen planus pigmentosus in 6 patients (7.5%), and pigment contact dermatitis in 4 patients (5%). Overall, melasma and post-inflammatory hyperpigmentation accounted for over half of the pigmentary disorders in this study population.

Table 2: Prevalence of Pigmentary Disorders		
Pigmentary Disorder	**Frequency (n = 80)**	**Percentage (%)**
Melasma	26	32.5
Post-inflammatory Hyperpigmentation	18	22.5
Vitiligo	16	20
Pityriasis Alba	10	12.5
Lichen Planus Pigmentosus	6	7.5
Pigment Contact Dermatitis	4	5

Table 3 summarizes the clinical presentations of various pigmentary disorders. In melasma, the malar region was involved in 65% of cases, and the centrofacial area in 35%. Post-inflammatory hyperpigmentation predominantly affected the face (55%) and extremities (45%). Vitiligo commonly involved the face (38%), hands (32%), and trunk (30%). Pityriasis alba was mainly seen on the face (80%) and arms (20%). Lichen planus pigmentosus showed equal involvement of the face and neck (50% each). Pigment contact dermatitis primarily affected the face (75%) with less frequent involvement of the neck (25%). Overall, the face was the most commonly affected site across all pigmentary disorders.

Table 3: Clinical presentation	
Pigmentary Disorder	**Clinical Presentation (%)**
Melasma	Malar Region (65), Centrofacial (35)
Post-inflammatory Hyperpigmentation	Face (55), Extremities (45)
Vitiligo	Face (38), Hands (32), Trunk (30)
Pityriasis Alba	Face (80), Arms (20)
Lichen Planus Pigmentosus	Face (50), Neck (50)
Pigment Contact Dermatitis	Face (75), Neck (25)

Discussion

The current paper presents the clinico-epidemiological spectrum of pigmentary diseases in patients

visiting a dermatology outpatient clinic, giving both similarities and differences with the previous research. The study population was predominantly adults with a mean age of 34.8 /10.6 years old and most of the population (50) was between the age of 21 to 40. This is in line with Sarkar and Jain (2013) who found that patients with melasma were between the ages of 33.6 years indicating that pigmentary disorders were common in young to middle aged adults in the Indian scenario. Funny enough, 30 percent of our participants were between the ages of 41-60 years with only 7.5 percent above 60 years old implying that the prevalence is on the decline in elderly people, just like it has been reported by Grimes et al., (2026) [11] who reported gradual decrease of new-onset pigmentary disorders in older age. Our study had a gender ratio of female dominance (62.5), which is in line with numerous research that have pointed out increased vulnerability or health seeking behavior in women (Pandya & Guevara, 2010; Thappa, 2004) [12,13]. This female dominance was especially clear in the cases of melasma, which could be attributed to hormonal effects and social worries about the color of the face (Achar & Rathi, 2011) [14]."

Workplace exposure became the major determinant, and the biggest group (35 percent) was made up of homemakers, and the next major determinant was the farmers and laborers (25 percent). This distribution has indicated the possible contribution of day sunlight exposure that had an average 4.6 ± 1.5 hours in our study, in the pathogenesis of pigmentary disorders. Halder and Nootheti (2003) [5] also made similar observations and noted that long-term exposure to ultraviolet light is one of the factors that help in melanogenesis and pigmentary exacerbation especially in people involved in outdoor activities. The urban concentration of our study participants reflects the results of Nouveau et al. (2016) [7] and the same article associates urban lifestyle and environmental pollution as the worsening factors of pigmentary alterations, suggesting that the occupational factor and the residential area can influence the clinical manifestations.

Melasma was the predominant pigmentary condition in our cohort with 32.5% followed by post inflammatory hyperpigmentation (22.5) and vitiligo (20). These data are consistent with various studies in India, which find melasma in 3040 per cent of dermatology patients (Sarkar & Jain, 2013) [15]. It was significant that 65 percent of melasma cases were mostly found in the malar region, and the Centro facial distribution was seen in 35 percent, as it has been found by Thappa (2004) [13], although certain studies demonstrated a greater involvement of the Centro facial area, and this appeared to be dependent on regions and environments. Post-inflammatory hyperpigmentation normally included the face (55%), and extremities (45%), which is consistent with the study by Nouveau (2016) [7], suggesting that inflammatory skin conditions, including acne and eczema, are common antecedents of secondary pigmentation in Indian population.

Vitiligo in our study mostly involved the face (38%), hands (32), and the trunk (30), which is similar to the distribution of the disease as reported by Handa and Kaur (1999) [16] whereby the acral and facial areas were mostly affected. Pityriasis alba was predominantly located on the face (80%), and arms (20%), as was reported by Dyląg et al., (2020) [18], which supports its typical affection to sun-exposed parts of children and youthful adults. The less common conditions, such as lichen planus pigmentosa's (7.5%), pigment contact dermatitis (5%), were also in line with the prevalence rates of similar disorders described by Kumarasinghe et al. (2019) [18] and Mahajan et al. (2021) [19] and suggest that the said disorders are relatively uncommon yet clinically influential because they tend to be chronic and have a cosmetic effect.

We are studying the multifactorial etiology of pigmentary disorders because the interactions of environmental factors including sunlight exposure and topical agents with genetic and hormonal predispositions contribute to pigmentary disorders. Pasricha et al. (2007) [4] also found the same observation when they have identified the heterogeneous clinical manifestations of pigmentary disorders, which are dependent on both intrinsic and extrinsic factors. Its psychosocial effect is significant, during which facial pigmentation is frequently a source of emotional distress and poor quality of life (Taylor et al., 2008) [20]. Specifically, the social and psychological burden, which is characterized by the high prevalence among women and the central involvement of the face in our cohort, requires the comprehensive approach to management incorporating the medical therapy, counseling, and patient education.

In general, we find that our results are mostly consistent with known literature on the distribution of pigmentary disorders and the clinical spectrum in India, although some minor variations in age distribution, occupational exposure and lesion localization are also noted. The frequency of melasma and post-inflammatory hyperpigmentation highlights the necessity of preventive action (such as sun protection and early diagnosis of inflammatory dermatoses) whilst the lesser rate of lichen planus pigmentosus and pigment contact dermatitis indicates that a specific diagnostic watchfulness is warranted. This study brings together epidemiological and clinical trends to create a complex picture of pigmentary diseases and their consequences to skin care in urban Indians.

Conclusion

The research indicates that pigmentary disorders have a frequent presence among patients visiting the

dermatology outpatient department and the presence is more so in young to middle-aged adults with a preponderance in females. Most of the affected were homemakers and laborers, which meant that there could be a correlation between lifestyle and exposure to sun. The most common disorder was melasma, which was then succeeded by post-inflammatory hyperpigmentation and vitiligo and showed specific patterns of clinical involvement with a preeminent location on the face. The results have highlighted the notable influence of pigmentary disorders on the appearance and quality of life of the individuals and the importance of specific preventive interventions, early detection, and the use of specific management techniques that would depend on the demographic and occupational characteristics of the target population.

References

1. Narurkar VA. Cosmetic dermatology. Preface. Dermatologic Clinics. 2009 Oct 1;27(4):xi-.
2. Dlova NC, Akintilo LO, Taylor SC. Prevalence of pigmentary disorders: A cross-sectional study in public hospitals in Durban, South Africa. International journal of women's dermatology. 2019 Dec 1;5(5):345-8.
3. Pal D, Biswas P, Das S, De A, Sharma N, Ansari A. Topical steroid damaged/dependent face (TSDF): A study from a tertiary care hospital in Eastern India. Indian journal of dermatology. 2018 Sep 1;63(5):375-9.
4. Pasricha JS, Khaitan BK, Dash S. Pigmentary disorders in India. Dermatologic clinics. 2007 Jul 1;25(3):343-52.
5. Halder RM, Nootheti PK. Ethnic skin disorders overview. Journal of the American Academy of Dermatology. 2003 Jun 1;48(6):S143-8.
6. Pasricha JS, Khaitan BK, Dash S. Pigmentary disorders in India. Dermatologic clinics. 2007 Jul 1;25(3):343-52.
7. Nouveau S, Agrawal D, Kohli M, Bernerd F, Misra N, Nayak CS. Skin hyperpigmentation in Indian population: Insights and best practice. Indian journal of dermatology. 2016 Sep 1;61(5):487-95.
8. Zhu WY, Li L, Zhang RZ, Peng SW, Wang HW, Tan C, Xu L, Pan M, Tian ZH, Zhao XD, Xing YL. Pigmentary disorder. InAtlas of skin disorders: challenging presentations of common to rare conditions 2018 Aug 1 (pp. 243-280). Singapore: Springer Singapore.
9. El-Bakary MA. Investigating the optical properties and molecular structure of PEEK fiber. Egyptian journal of basic and applied sciences. 2016 Dec 1;3(4):366-76.
10. Bandyopadhyay D. Topical treatment of melasma. Indian journal of dermatology. 2009 Oct 1;54(4):303-9.
11. Grimes P, Nordlund JJ, Pandya AG, Taylor S, Rendon M, Ortonne JP. Increasing our understanding of pigmentary disorders. Journal of the American Academy of Dermatology. 2006 May 1;54(5):S255-61.
12. Pandya AG, Guevara IL. Disorders of hyperpigmentation. Dermatologic clinics. 2000 Jan 1;18(1):91-8.
13. Thappa DM. Melasma (chloasma): A review with current treatment options. Indian Journal of Dermatology. 2004 Oct;49(4):165-76.
14. Achar A, Rathi SK. Melasma: a clinico-epidemiological study of 312 cases. Indian journal of dermatology. 2011 Jul 1;56(4):380-2.
15. Sarkar R, Jain RK, Puri P. Melasma in Indian males. Dermatologic surgery. 2003 Feb 1;29(2):204.
16. Handa S, Kaur I. Vitiligo: clinical findings in 1436 patients. The Journal of dermatology. 1999 Oct;26(10):653-7.
17. Dyląg M, Leniak E, Gnat S, Szepietowski JC, Kozubowski L. A case of anti-pityriasis versicolor therapy that preserves healthy mycobiome. BMC dermatology. 2020 Sep 29;20(1):9.
18. Kumarasinghe SP, Pandya A, Chandran V, Rodrigues M, Dlova NC, Kang HY, Ramam M, Dayrit JF, Goh BK, Parsad D. A global consensus statement on ashy dermatosis, erythema dyschromicum perstans, lichen planus pigmentosus, idiopathic eruptive macular pigmentation, and Riehl's melanosis. International journal of dermatology. 2019 Mar;58(3):263-72.
19. Mahajan VK, Handa S. Diagnosis of skin diseases. InAtlas of dermatology, dermatopathology and venereology: Cutaneous anatomy, biology and inherited disorders and general dermatologic concepts 2021 Oct 7 (pp. 45-107). Cham: Springer International Publishing.
20. Taylor A, Pawaskar M, Taylor SL, Balkrishnan R, Feldman SR. Prevalence of pigmentary disorders and their impact on quality of life: a prospective cohort study. Journal of cosmetic dermatology. 2008 Sep;7(3):164-8.