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UNMASKING THE HIDDEN BURDEN: A CLINICODEMOGRAPHIC APPRAISAL OF INFLAMMATORY SKIN DISEASES IN THE INDIAN POPULATION

Dermatology

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ABSTRACT

Background: Cutaneous inflammatory disorders (CIDs) are chronic, relapsing conditions that pose a growing global health challenge due to their systemic comorbidities and significant impact on quality of life. They share common pathogenic mechanisms, including epidermal barrier dysfunction, persistent immune activation, and cutaneous microbiome dysbiosis. Despite their clinical burden, comprehensive data on the epidemiology and clinical presentation of CIDs in the Indian population remain limited. **Methods:** This was a retrospective, multi-centric, cross-sectional, observational study conducted across various healthcare centers in India. Parameters recorded included patient demographics, diagnostic categories, symptom patterns, seasonal variation, therapeutic interventions, lifestyle modifications, and comorbidities. **Results:** A total of 10,861 patients diagnosed with CIDs were analyzed. Psoriasis was the most prevalent diagnosis (33.8%), followed by atopic dermatitis (28.1%), with a notable proportion falling under moderate and severe categories, more common in males than females. The Face was the most commonly affected anatomical site. Use of sunscreen and moisturizers is most common nonpharmacological measure suggested. **Conclusions:** This study offers a robust clinical and demographic overview of CIDs in India, emphasizing the high prevalence of psoriasis and AD. Findings underscore the importance of barrier repair strategies, particularly emollient use, in disease management. These insights are critical for tailoring evidence-based approaches to CID management in India and lay the foundation for future epidemiological and interventional research in this domain.

KEYWORDS

Cutaneous inflammatory disorders, atopic dermatitis, psoriasis, moisturizer

INTRODUCTION

Cutaneous inflammatory disorders (CIDs) represent a significant and growing global health challenge, primarily due to their chronic, relapsing nature, frequent comorbidities, and profound impact on both physical and mental health. These conditions encompass a heterogeneous group of diseases—including atopic dermatitis (AD), psoriasis, seborrheic dermatitis, contact dermatitis, lichen planus, and autoimmune connective tissue diseases such as lupus erythematosus and dermatomyositis. Despite their distinct clinical and histological presentations, they share core pathogenic features such as epidermal barrier dysfunction, persistent immune activation, and a disrupted cutaneous microbiome.[1,2]

The epidemiological burden of CIDs is staggering. AD affects approximately 15–20% of children and up to 10% of adults in developed countries, with increasing incidence noted in low- and middle-income regions as well[3] . Psoriasis affects about 2–3% of the global population, with higher prevalence reported in Northern Europe and North America[4]. Environmental contributors such as urbanization, industrial pollution, rising allergen exposure, dietary changes, and reduced contact with environmental microbes in early life are implicated in the rising incidence of these disorders. Climate change and indoor air quality have also emerged as modifiable risk factors in recent epidemiologic studies.[5,6]

Moreover, CIDs impose a significant burden on healthcare systems, contributing to a high volume of outpatient dermatology consultations, long-term medication use, and indirect costs related to reduced productivity and quality of life.[7,8].

The psychosocial impact of CIDs is considerable and multifaceted. Patients often experience diminished self-esteem, social isolation, relationship difficulties, and workplace discrimination due to the visibility of skin lesions and chronic discomfort. Chronic pruritus, pain, and disfigurement may impair sleep, reduce concentration, and contribute to poor academic or occupational performance. Numerous studies have reported the increased prevalence of depression, anxiety, and even suicidality among patients with chronic dermatoses, including psoriasis and AD.[9,10] Quality-of-life assessments, such as the Dermatology Life Quality Index (DLQI), consistently show that patients with CIDs suffer impairments comparable to those with systemic diseases such as asthma, diabetes, or heart failure.[11,12]

From a pathophysiological standpoint, CIDs result from a complex and dynamic interaction between host genetics, environmental insults, immune dysregulation, and microbial alterations. In AD, mutations in the filaggrin gene (FLG)- crucial for maintaining stratum corneum integrity—lead to trans epidermal water loss and increased allergen and pathogen penetration, initiating a T-helper (Th) 2-dominated immune cascade involving Interleukin (IL) -4, IL-5, IL-13, and IL-31.[13,14] In psoriasis, IL-23 stimulates Th17 and Th22 cells to release IL-17 and IL-22, which drive keratinocyte hyperproliferation and neutrophilic inflammation. Additionally, genetic loci such as PSORS1 on chromosome 6p21 and polymorphisms in TNFAIP3 and IL23R are strongly associated with disease susceptibility.[15]. While many of these mechanisms are shared globally, the contribution of region-specific environmental and genetic factors to CID pathogenesis in Indian populations is an area that warrants further investigation.

Microbiome dysbiosis plays an increasingly recognized role in CIDs. The skin of patients with AD often exhibits reduced microbial diversity and dominance of Staphylococcus aureus, which exacerbates inflammation through production of toxins, proteases, and superantigens. Psoriatic skin, in contrast, shows alterations in Corynebacterium, Streptococcus, and Malassezia species, although causal relationships remain under investigation.[16,17] The "outside-inside" and "inside-outside" paradigms suggest a bidirectional interplay between barrier integrity and immune activation, with microbial dysbiosis acting as both a cause and consequence of disease.

Recent advances in immune dermatology have transformed the therapeutic landscape. The introduction of biologic agents targeting specific cytokines (e.g., IL-4Rα inhibitors like dupilumab for AD, and IL-17/IL-23 inhibitors such as secukinumab, guselkumab, and risankizumab for psoriasis) has led to significant improvements in disease control and patient quality of life.[18,19] Small molecule inhibitors such as JAK inhibitors (e.g., baricitinib, abrocitinib) offer oral alternatives with broad cytokine modulation. Research into microbiome modulation, including topical probiotics, microbial transplantation, and bacteriophage therapy, represents a promising frontier in CID treatment.[20]. However, access to advanced therapies such as biologics and JAK inhibitors remains limited in many low- and middle-income countries, including India, due to high costs and regulatory barriers.

Despite the increasing global interest in the molecular and clinical landscape of CIDs, there is paucity of data characterizing these disorders in diverse populations such as India. This study assesses the demographic and clinical characteristics of patients with inflammatory skin diseases in India.

METHODS

Study Design & Population

The study employed a retrospective, multi-centric, cross-sectional,

and observational design, drawing data from a diverse range of healthcare settings across India, including hospitals, clinics, and healthcare institutes. Participating physicians retrospectively collected data using a standardized case record form (CRF). Patient selection for inclusion in this study was solely at the treating physician's discretion, and no additional evaluations or investigations were conducted specifically for the purpose of data capture.

Data Collection

This retrospective, multi-centric, cross-sectional, observational study gathered data from various healthcare facilities throughout India. Participating physicians used a standardized case record form to collect retrospective data, with patient selection determined by their clinical judgment and without any additional evaluations being conducted for the study. The collected data encompassed demographics; diagnosis (including AD, Psoriasis, Vitiligo, Alopecia, and other dermatological disorders); presenting complaints; seasonal symptom variations; lifestyle modifications and pharmacotherapy; and associated comorbidities such as autoimmune diseases, depression, anxiety, and hormonal disorders. Following the compilation of the data, basic statistical analyses were performed to determine the most common inflammatory skin diseases in clinical settings, the percentage of patients with specific diagnoses (AD, alopecia areata, vitiligo, etc.), the prevalence of these diseases across different age and gender groups, their clinical manifestations, associated comorbidities, the treatments administered, and the lifestyle modifications adopted by patients.

Ethical Considerations

In accordance with the ICMR's "Ethical guidelines for Biomedical research on Human participants," the protocol was deemed to present less than minimal risk, and appropriate Ethics Committee (EC) approval was obtained. Given the retrospective nature of the study, wherein participants were de-identified and could not be contacted, permission for a waiver of consent was secured from the EC.

Statistical Analysis

The statistical analysis was conducted using [Specify the statistical software used, e.g., SPSS version 27.0, R version 4.3.1]. Descriptive statistics were used to summarize the demographic characteristics of the study population, including age, height, weight, and duration of the condition. Continuous variables were presented as means and standard deviations (SD), while categorical variables were presented as frequencies and percentages. For all statistical tests, a significance level of $p < 0.05$ was used.

RESULTS

A total of 10,861 individuals were included in the study. The population had a mean age of 36.0 years (±14.1), with an average weight of 63.8 kg. The average duration of the condition was 0.5 years. The gender distribution was nearly balanced, with 52.3% male (n = 5,677) and 47.7% female (n = 5,184).

Table No.01: Summary Of Demographic Characteristics

	Summary Statistics	Overall Total (N=10861) n (%)
Age (Years)	Mean ± SD	36.0 ± 14.1
Height (cm)	Mean ± SD	160.0 ± 14.2
Weight (kg)	Mean ± SD	63.8 ± 13.5
Duration (Years)	Mean ± SD	0.5 ± 1.4
Gender, n (%)	Male	5677 (52.3)
	Female	5184 (47.7)
n: Number of subjects, SD: Standard Deviation, Min: Minimum, Max: Maximum, Q1: First quartile, Q3: Third quartile		

Figure no. 01 illustrates that psoriasis was the most frequently reported diagnosis, comprising 4,450 cases (33.8%) of the total 13,161 cases. This was followed by atopic dermatitis, with 3,700 cases (28.1%), and fungal infections, with 1,750 cases (13.3%). Acne accounted for 1,700 cases (12.9%), while lichen planus was reported in 1,100 cases (8.4%). The "Others" category, which includes conditions such as burns, rashes, and hyperkeratosis, represented 1,161 cases (8.8%). These findings indicate a clear predominance of chronic inflammatory and barrier-related skin conditions, with psoriasis and atopic dermatitis together accounting for over 60% of all diagnoses. This underscores a significant burden of skin inflammation and barrier dysfunction in the study population, emphasizing the need for focused diagnostic and therapeutic strategies.

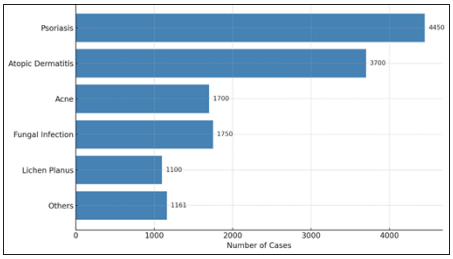

Figure No. 01: Distribution of Top Diagnoses in the Study

Population

The most affected area in the cohort is the face, followed by combinations of arms, legs, and neck. Notably, regions such as the back, abdomen, and chest also exhibit significant involvement. The frequent combination of the face, neck, chest, and back suggests a broader involvement of the upper body in many cases. Less commonly, the genital area and combinations involving the arms, legs, and abdomen are affected. This pattern underscores the variability in the distribution of skin involvement, with areas showing higher frequencies of involvement in the study cohort. (Refer Table No. 02)

Table No.02: Distribution of Commonly Affected Body Areas in the Study population

Affected Area(s)	Frequency
Face	Most common
Arms + Legs + Neck	Second most common
Back, Abdomen, Chest	Common
Face + Neck + Chest + Back	Notable combination
Genital Area, Arms + Legs + Abdomen	Infrequent

Note: This table includes the most frequently reported regions and their common combinations.

The analysis of non-pharmacological recommendations provided to participants revealed that the most frequent advice was the use of sunscreen and moisturizers, underscoring the emphasis on photoprotection. This was followed by guidance to avoid irritants and adopt lifestyle modifications, both of which are critical for minimizing flare-ups and maintaining skin health. Notably, a subset of participants received combined recommendations, particularly involving both irritant avoidance and lifestyle adjustments, reflecting a holistic approach to managing chronic or sensitive skin conditions. (Refer Table No.03)

Table No.03: Summary of Additional Recommendations Given to Participants

Recommendation	Frequency
Use of sunscreen and moisturizers	Most common
Avoidance of irritants	Common
Lifestyle modifications	Common
Combination of avoiding irritants + lifestyle changes	Notable combination
Other recommendations	Less common

Figure no.02 shows the distribution of diagnoses across genders. Psoriasis and atopic dermatitis were the most frequently reported conditions in both males and females, with a higher prevalence in males. Across all conditions, males consistently showed greater case numbers than females, indicating a gender disparity in the burden of dermatological diagnoses in the study population.

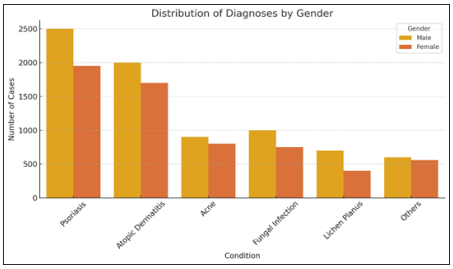

Figure No. 02: Distribution of Diagnoses by Gender

Figure no. 03 illustrates the distribution of dermatological conditions across different severity levels. Psoriasis and atopic dermatitis

accounted for the highest number of cases, with a notable proportion falling under moderate and severe categories. Conditions such as acne and fungal infections predominantly presented with mild to moderate severity, while lichen planus and others exhibited a more balanced but comparatively lower distribution across severity levels. The data highlights that inflammatory conditions like psoriasis and atopic dermatitis tend to manifest more severely in clinical settings.

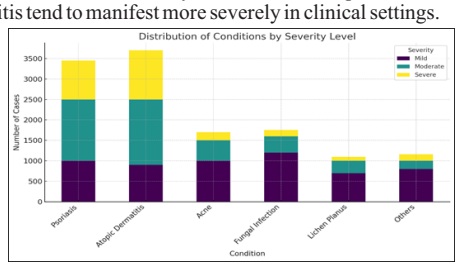

Figure No. 3: Distribution of Conditions by Severity level

Lotions were the most commonly used moisturizer formulation (43.1%), followed by creams (37.0%) and gels (19.9%). Emollients were the most frequently used moisturizer type (34.0%), followed by ceramide-based (23.9%), occlusive (19.7%), humectant (13.7%), and combination formulations (8.7%).

Seasonal variation was reported by 11.4% of participants, with winter being the most common trigger (7.3%), followed by summer (2.7%), monsoon (1.2%), and autumn (0.2%). The remaining 88.6% reported no seasonal variation (refer table 04)

Table 04: Use of moisturizers in CIDs

	Summary Statistics	Overall Total (N=10861) n (%)
Moisturizer formulation, n (%)	Lotions	4682 (43.1)
	Cream	4022 (37.0)
	Gel	2157 (19.9)
Type of Moisturiser, n (%)	Emollient	3691 (34.0)
	Ceramide based	2594 (23.9)
	Occlusive	2138 (19.7)
	Humectant	1491 (13.7)
	Combination	947 (8.7)
Seasonal Variation, n (%)	No	9623 (88.6)
	Yes-Winter	792 (7.3)
	Yes-Summer	291 (2.7)
	Yes-Monsoon	131 (1.2)
	Yes-Autumn	24 (0.2)

DISCUSSION

This extensive observational study, analyzing data from 10,861 individuals across India, offers significant insights into the contemporary landscape of dermatological conditions, patient demographics, and real-world moisturizer utilization. The study's demographic profile, characterized by a nearly equal gender distribution and a mean age of 36 years, is consistent with patient cohorts reported in similar large-scale dermatological practice studies[21].

A striking finding was the high prevalence of dry (40%) and sensitive (30%) skin types, which points to a substantial population prone to epidermal barrier dysfunction. These observations align with established dermatological understanding that environmental aggressors, such as low humidity, frequent cleansing, and the use of harsh soaps, can compromise the skin barrier, leading to xerosis and sensitivity, particularly in urban settings[22]. Regarding moisturizer formulations, lotions were the most used (43.1%), followed by creams (37%) and gels (19.9%). This preference for lighter formulations may be influenced by the prevalent warm and humid climate, or individual patient preferences for non-greasy textures, a pattern frequently noted in dermatological practices in tropical and subtropical regions[23].

Emollient-based moisturizers were not only the most widely prescribed category (34%) but also demonstrated the highest rate of clinical improvement (90.7%). This outcome strongly supports previous randomized controlled trials that have highlighted the superior efficacy of emollients in enhancing skin barrier repair and providing sustained hydration, crucial for managing conditions like xerosis and atopic dermatitis[21,22]. The high improvement rate coupled with a remarkably low incidence of adverse events (0.1%) underscores the favorable safety and efficacy profile of moisturizers when used appropriately. While emollients were predominantly associated with mild to moderate cases, more specialized formulations such as ceramide-based and occlusive moisturizers were more frequently utilized in severe cases. This suggests a targeted prescribing strategy, where formulation choice is guided by disease severity and specific barrier repair needs, rather than an indication of differential efficacy across all severities.

The spectrum of dermatological conditions identified—led by atopic dermatitis (AD), generalized dryness, and acne—reflects a significant burden of inflammatory and barrier-compromise-related skin disorders within the study population. The prevalence of AD and acne in our cohort is consistent with global epidemiological data, which consistently rank these conditions among the most common dermatological diagnoses across various age groups[24,25]. Furthermore, the notable occurrence of fungal infections and eczematous conditions underscores the existing evidence of a considerable dermatophyte burden in regions characterized by warm and humid environmental conditions[26]. This aligns with broader insights into the complex interplay between host immunity, environmental factors, and the cutaneous microbiome in inflammatory skin diseases[16,20,27].

Prescription patterns within the study emphasized fundamental strategies: hydration and barrier repair each accounted for approximately 25% of recommendations, highlighting their foundational role in dermatological therapy. Adjunctive therapies were selectively employed (15%), typically in more severe or treatment-refractory conditions, consistent with clinical guidelines that advocate for an emollient-first approach, reserving pharmacologic interventions for cases requiring more intensive management[28]. The integration of additional recommendations, such as sunscreen use, irritant avoidance, and lifestyle modifications, underscores a holistic approach to patient care. Such non-pharmacologic interventions are particularly critical for long-term management and recurrence prevention in chronic inflammatory conditions like AD.

An intriguing observation was that only a small proportion (11.4%) of the study population reported seasonal variation in their skin conditions, with winter being the most frequently cited season. This contrasts with reports from Western populations, where seasonal impacts, particularly in winter, are often more pronounced[29]. This difference could be attributed to the more moderate climatic variations in certain regions of India or potentially a lower patient awareness of subtle seasonal triggers within our cohort. Furthermore, an age-severity trend was discernible, with older individuals exhibiting more severe diseases. This finding is congruent with existing literature indicating age-related declines in skin barrier function, reduced epidermal lipid synthesis, and impaired wound healing capabilities in the elderly, contributing to increased susceptibility to severe skin conditions[30]. The role of genetic factors, such as filaggrin gene mutations, in barrier dysfunction and conditions like AD, also provides a contextual understanding for the prevalence of dryness and AD[13,31].

Despite its considerable sample size and comprehensive data collection, this study is subject to several limitations. Firstly, its observational design precludes the establishment of definitive causal relationships between specific moisturizer types and clinical outcomes. While strong associations were observed, randomized controlled trials would be necessary to confirm causality. Secondly, diagnoses were based on the treating physicians' clinical judgment, which inherently introduces potential for inter-rater variability and diagnostic subjectivity across different evaluators. Lastly, the study did not collect data on potentially confounding factors such as socioeconomic status, patient comorbidities, or the concomitant use of other medications. These variables can significantly influence both the manifestation of skin conditions and the response to treatment, and their absence represents a limitation in providing a more holistic understanding of patient care.

CONCLUSION

This study presents a comprehensive characterization of cutaneous inflammatory disorders within a large and diverse Indian cohort, offering valuable real-world insights into clinical presentations, nonpharmacological recommendations and moisturizer usage. The findings underscore the substantial burden of inflammatory and barrier-compromised dermatoses, particularly psoriasis and atopic

dermatitis, across varied demographic profiles. The pivotal role of emollients in restoring epidermal barrier function and maintaining hydration is reaffirmed, reinforcing their centrality in therapeutic regimens. These data not only enrich the current understanding of CIDs in the Indian context but also hold significant implications for public health planning, the development of context-specific clinical guidelines, and the optimization of dermatologic care delivery in resource-diverse settings.

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