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Mucocutaneous Manifestations in Substance Abuse in Central India: A Cross-Sectional Observational Study

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ABSTRACT

Background: Substance abuse is a major public health problem associated with significant systemic, psychological, and dermatological complications. Chronic use of substances such as alcohol, tobacco, cannabis, opioids, and other psychoactive agents can produce a wide range of mucocutaneous manifestations involving the skin, oral mucosa, hair, and nails. These manifestations may serve as early clinical indicators of underlying substance use disorder.
Aim: To evaluate the mucocutaneous manifestations associated with substance abuse in individuals attending a tertiary care centre in Central India and to assess their association with demographic factors and duration of substance use.
Materials and Methods: This hospital-based observational study was conducted in the Department of Dermatology, Venereology and Leprology at RKDF Medical College Hospital and Research Centre, Bhopal. A total of 206 participants with a history of substance abuse were enrolled using a non-probability convenience sampling technique. Detailed demographic and substance-use history was obtained using a structured questionnaire. Comprehensive dermatological, oral, hair, nail, and systemic examinations were performed. Statistical analysis was performed using SPSS, and $p < 0.05$ was considered statistically significant.
Results: The study population showed a marked male predominance (91.7%), with most participants belonging to the middle-aged group. The mean duration of substance use was 10.39 ± 5.69 years. Commonly observed mucocutaneous manifestations included pruritus, xerostomia, urticaria, scars, ulcers, and hyperpigmentation. Oral mucosal changes such as pigmentation and cheilitis were frequently observed. Hair and nail abnormalities, including diffuse hair fall, alopecia, leukonychia, and clubbing, were also noted. No statistically significant association was found between duration or type of substance abuse and mucocutaneous manifestations.
Conclusion: Mucocutaneous manifestations are highly prevalent among individuals with substance use disorders and may provide important clinical clues for early diagnosis. Dermatological evaluation should form an integral component of multidisciplinary substance abuse management.

Keywords*: Substance abuse; Mucocutaneous manifestations; Oral lesions; Dermatology; Substance use disorder.*

INTRODUCTION

Substance abuse is a major global public health concern associated with significant medical, psychological, and social consequences. Substance use disorder is defined as the continued use of psychoactive substances despite harmful physical, behavioral, and psychological effects. Commonly abused substances include alcohol, tobacco, cannabis, opioids, cocaine,

and other illicit drugs. Chronic substance abuse affects multiple organ systems, including the skin and mucous membranes, which frequently show early visible manifestations of systemic toxicity and immunological compromise. Dermatological manifestations in substance abusers may result from direct toxic effects of the substance, nutritional deficiencies, poor hygiene, vascular injury, repeated trauma, infections, and impaired immunity. These manifestations often provide important diagnostic clues, especially in patients who conceal their substance use history.[1,2]

Mucocutaneous manifestations associated with substance abuse involve the skin, oral mucosa, hair, and nails. Alcohol abuse has been associated with xerosis, glossitis, angular cheilitis, pellagroid dermatoses, recurrent fungal infections, and vascular changes. Tobacco use, particularly smokeless tobacco, predisposes individuals to leukoplakia, smoker's melanosis, oral submucous fibrosis, erythroplakia, and oral malignancies.[3] Intravenous opioid use commonly presents with track marks, cellulitis, thrombophlebitis, abscesses, chronic ulcers, and scarring, whereas cannabis abuse may lead to oral mucosal irritation, xerostomia, pigmentary changes, and periodontal disease.[4] The severity of these manifestations generally increases with prolonged duration of substance use due to cumulative toxic exposure, nutritional compromise, chronic inflammation, and immune dysfunction.[5]

India has witnessed a progressive rise in substance abuse over the last decade, particularly among young adults and economically productive age groups. National surveys have reported alcohol and tobacco as the most commonly abused substances, followed by cannabis and opioids.[6] Central India represents a unique demographic region with a substantial rural and semi-urban population, socioeconomic vulnerabilities, and limited access to dermatological and de-addiction services. Stigma, poor awareness, and underreporting further contribute to delayed diagnosis and treatment in this region. Although the epidemiology of substance abuse has been studied extensively, limited Indian studies have systematically evaluated the spectrum of mucocutaneous manifestations associated with different substances, especially in Central India.[7]

Gender differences also play an important role in the pattern of substance abuse and associated mucocutaneous changes. Men demonstrate significantly higher prevalence of alcohol, tobacco, and opioid use, resulting in a greater burden of oral lesions, infections, vascular changes, and injection-related skin manifestations.[8] Furthermore, the association between duration of substance abuse and the extent and severity of mucocutaneous involvement remains inadequately explored in the Indian population. Early recognition of these manifestations may facilitate timely diagnosis, multidisciplinary management, and prevention of long-term complications.

Hence, the present study was undertaken to answer the research question: "What is the association between the duration of substance abuse and the severity and extent of mucocutaneous changes among individuals in Central India, and how do demographic factors, particularly gender, contribute to variations in these clinical manifestations?"

METHODOLOGY

Study Design and Setting

The present study was a hospital-based observational study conducted in the Department of Dermatology, Venereology and Leprology at RKDF Medical College Hospital and Research Centre, Bhopal, Madhya Pradesh.

Study Population and Sample Size

The study included 206 individuals with a history of substance abuse attending the outpatient and inpatient departments during the study period. Participants with abuse of substances such as alcohol, tobacco, cannabis, opioids, and other psychoactive agents were included in the study. Clearance was obtained from the Institutional Ethical Committee before commencing the study (IECRKDFMCRC/30/2023)

Ethical Clearance and Informed Consent

Prior approval for the study was obtained from the Institutional Ethics Committee of RKDF Medical College Hospital and Research Centre, Bhopal. The study was conducted in accordance with ethical principles for human research. Written informed consent was obtained from all study participants before enrollment after explaining the nature and objectives of the study in their understandable language.

Inclusion Criteria

- Individuals aged more than 18 years with a history of substance abuse.
- Patients willing to participate in the study.
- Patients providing written informed consent.

Exclusion Criteria

- Patients unwilling to participate in the study.
- Patients with severe systemic illness precluding clinical examination.
- Patients with dermatological diseases unrelated to substance abuse.

Data Collection Procedure
A detailed history was obtained from all participants regarding demographic profile, socioeconomic status, type of substance abused, duration of substance use, method of intake, frequency of use, dosage patterns, and previous attempts to quit substance use. Detailed clinical examination including general physical examination and mucocutaneous examination was performed in every participant.

Special emphasis was given to the evaluation of skin, oral mucosa, hair, and nail manifestations associated with substance abuse. Oral lesions such as leukoplakia, oral submucous fibrosis, glossitis, candidiasis, and angular cheilitis were recorded. Skin manifestations including infections, pigmentary changes, ulcers, vascular lesions, and injection-related lesions were also documented. Hair and nail abnormalities were assessed systematically.

Information regarding nutritional status, hygiene practices, psychiatric illness, psychiatric medication use, liver function status, and treatment-seeking behavior was also recorded.

Statistical Analysis
The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software 26.0 version. Descriptive statistics were expressed as mean, standard deviation, frequencies, and percentages. Chi-square test was applied to assess associations between categorical variables. Correlation and regression analyses were performed to determine the association between duration of substance abuse and quality-of-life scores as well as mucocutaneous manifestations. A p-value of less than 0.05 was considered statistically significant.

RESULTS
A total of 206 participants with a documented history of substance abuse were enrolled in the study. The study population showed a marked male predominance, and most participants were middle-aged adults. Alcohol, tobacco, cannabis, opioids, sedatives, and polysubstance abuse were the commonly reported substances. Most participants had prolonged substance exposure and presented with a wide spectrum of mucocutaneous manifestations involving the skin, oral mucosa, hair, and nails.

Table 1: Demographic Profile and Substance Use Characteristics of Study Participants

Variable	Frequency / Mean ± SD	Percentage (%)
Male	189	91.7
Female	17	8.3
Predominant age group	31–50 years	—
Mean duration of substance use (years)	10.39 ± 5.69	—
Median duration of substance use (years)	10.5	—
Participants attempting to quit substance use	117	56.8
Participants with no quit attempt	89	43.2
Common substances abused	Alcohol, tobacco, cannabis, opioids, sedatives, polysubstance use	—

The study population was predominantly male, with most participants belonging to the middle-aged group. Long-term substance exposure was common, with a mean duration of use exceeding 10 years. More than half of the participants had attempted de-addiction at least once.

Table 2: Clinical and Mucocutaneous Manifestations among Study Participants

Manifestation	Frequency (n)	Percentage / Observation
Pruritus	27	Common
Urticaria	27	Common
Xerostomia	27	Common
Scars	25	Frequent
Ulcers	25	Frequent
Hyperpigmentation	23	Frequent
Pallor/Fatigue	66	32.0%
Normal general examination	140	68.0%
Oral mucosal changes	Pigmentation, cheilitis, tooth decay	Common
Nail changes	Clubbing, leukonychia, Beau's lines	Present
Hair changes	Alopecia, diffuse hair fall	Present
Common extent of involvement	Face, trunk, limbs, generalised	Multisite involvement

Pruritus, xerostomia, and urticaria were the most commonly observed mucocutaneous manifestations. Oral mucosal involvement, nail abnormalities, and hair changes were frequently identified, indicating multisystem dermatological involvement among substance users. Approximately one-third of participants also exhibited systemic findings, including pallor and fatigue.

Table 3: Association of Duration of Substance Use with Quality of Life and Mucocutaneous Manifestations

Parameter	Result
Mean QoL score	60.47 ± 23.46
Median QoL score	61.6
Spearman correlation coefficient (ρ) between duration of use and QoL	–0.0928
p-value	0.1848
Association between substance type and mucocutaneous manifestations	Not statistically significant
Chi-square value	32.05
Degrees of freedom	36
p-value	0.6569
Regression coefficient for duration of use predicting QoL	–0.408
Regression model R^2	0.011

Although participants with prolonged substance use demonstrated considerable dermatological morbidity and reduced quality-of-life scores, statistical analysis did not show a significant association between duration of substance use and QoL scores. Similarly, the distribution of mucocutaneous manifestations did not vary significantly according to the type of substance abused.

The present study demonstrated a high prevalence of mucocutaneous manifestations among individuals with substance abuse in Central India. The majority of participants were middle-aged males with prolonged substance exposure. Cutaneous manifestations such as pruritus, urticaria, ulcers, scars, and hyperpigmentation were commonly observed, along with significant oral, hair, and nail involvement. Despite the extensive clinical burden, no statistically significant association was found between type or duration of substance abuse and the occurrence of mucocutaneous manifestations. These findings highlight the importance of detailed dermatological evaluation in all individuals with substance use disorders.

DISCUSSION

The present study was conducted to evaluate the spectrum of mucocutaneous manifestations among individuals with substance abuse in Central India and demonstrated a substantial burden of dermatological, oral, hair, and nail abnormalities among chronic substance users. Substance abuse is increasingly recognized as a multisystem disorder with important dermatological implications, as the skin and mucous membranes often provide early visible clues to underlying addiction. In the present study, a marked male predominance was observed, with males constituting more than 90% of the study population. This finding is consistent with previous studies reporting significantly higher prevalence of substance abuse among males due to greater social exposure, occupational stress, peer influence, and easier accessibility to addictive substances.[9] The majority of participants belonged to the middle-aged adult group, indicating that substance abuse predominantly affects the economically productive age group and may contribute significantly to long-term health and socioeconomic burden.

The present study demonstrated a wide spectrum of mucocutaneous manifestations among substance users. The most commonly observed findings were pruritus, xerostomia, urticaria, scars, ulcers, and hyperpigmentation. Similar patterns have been described in dermatological studies evaluating substance use disorders, where cutaneous manifestations were identified as among the earliest visible clinical indicators of chronic substance abuse.[10,11] Chronic exposure to addictive substances can produce dermatological injury through multiple mechanisms, including immune dysregulation, vascular compromise, nutritional deficiencies, direct chemical toxicity, repeated trauma, poor hygiene, and secondary bacterial or fungal infections.[12] Repeated exposure to tobacco smoke, alcohol metabolites, injected substances, and contaminated paraphernalia may further aggravate chronic inflammatory and infectious skin conditions.

Pruritus was one of the most frequent manifestations observed in the present study. Chronic pruritus in substance users may result from histamine release, xerosis, hepatic dysfunction, allergic responses, or opioid-induced neurocutaneous stimulation. Similarly, urticaria and hyperpigmentation observed in many participants may reflect chronic inflammatory changes, vascular instability, and post-inflammatory alterations secondary to repeated skin injury and substance-induced toxicity.[10,12] Scars and ulcers were also common findings in the present study, particularly among individuals with prolonged substance use and injection-related practices. Such lesions may result from recurrent trauma, skin popping, vascular injury, thrombophlebitis, and delayed wound healing associated with chronic substance exposure.[11]

Oral mucosal changes formed an important component of the clinical findings in the present study. Pigmentation, cheilitis, xerostomia, and dental abnormalities were frequently identified among participants. Similar oral findings have been reported in studies evaluating chronic tobacco and alcohol users, where persistent mucosal irritation, nutritional

deficiencies, poor oral hygiene, and chronic inflammatory changes contributed to oral lesions and premalignant mucosal alterations.[13] Xerostomia observed in the present study may be attributed to dehydration, smoking-related salivary gland dysfunction, autonomic imbalance, and chronic cannabis or tobacco use. Oral mucosal changes are clinically significant because they may serve as early indicators of chronic substance abuse and may also predispose individuals to secondary infections and malignant transformation.

Hair and nail abnormalities were also commonly observed among the participants. Diffuse hair fall, alopecia, leukonychia, and clubbing were among the notable findings. These manifestations may be secondary to chronic malnutrition, oxidative stress, hepatotoxicity, metabolic disturbances, and systemic compromise associated with prolonged substance abuse.[10,11] Chronic alcohol and polysubstance use can impair protein metabolism and micronutrient absorption, thereby affecting keratinisation and appendageal health. Nail changes such as leukonychia may additionally indicate underlying hepatic dysfunction and nutritional compromise in chronic users.

Systemic findings, including pallor and fatigue, were observed in nearly one-third of the participants in the present study. These findings may indicate anaemia, nutritional deficiencies, chronic systemic inflammation, or metabolic dysfunction associated with long-term substance abuse. Chronic alcohol intake in particular has been associated with folate deficiency, iron deficiency, and impaired nutritional absorption, all of which may contribute to generalised weakness and pallor.[12] Such systemic manifestations further emphasise the multisystem impact of chronic substance abuse.

The mean duration of substance use in the present study exceeded 10 years, indicating prolonged exposure among the study participants. However, despite extensive mucocutaneous involvement, no statistically significant association was identified between duration of substance use and quality-of-life scores or specific mucocutaneous manifestations. Although previous studies have suggested that longer duration of substance abuse is associated with increasing dermatological severity, the present study did not demonstrate a statistically significant duration-dependent relationship.[10,12] This difference may be explained by the influence of multiple confounding factors such as nutritional status, hygiene practices, polysubstance abuse, immune status, and individual susceptibility, which may independently affect dermatological presentation irrespective of duration alone.

Similarly, the present study did not demonstrate a statistically significant association between the type of substance abused and the pattern of mucocutaneous manifestations. Considerable overlap was observed in dermatological findings across different substances. This may be because many addictive substances share common pathogenic pathways, including immune suppression, vascular injury, chronic inflammation, oxidative stress, malnutrition, and secondary infection.[11,12] Therefore, while certain manifestations may be more suggestive of specific substances, the overall clinical pattern often overlaps substantially in chronic users.

The findings of the present study highlight the importance of detailed dermatological examination in all individuals with substance use disorders. Mucocutaneous manifestations may serve as valuable clinical indicators for early identification of hidden substance abuse, particularly in patients unwilling to disclose addiction history. Early recognition and multidisciplinary management involving dermatologists, psychiatrists, physicians, and de-addiction specialists may help reduce morbidity, improve quality of life, and prevent long-term systemic complications among substance-dependent individuals.[9–13]

CONCLUSION

The present study demonstrated a high prevalence of mucocutaneous manifestations among individuals with substance abuse in Central India, with pruritus, xerostomia, urticaria, scars, ulcers, and oral mucosal changes being the most common findings. The study population showed a marked male predominance and predominantly involved middle-aged adults with prolonged substance exposure. Hair, nail, and systemic manifestations further highlighted the multisystem impact of chronic substance abuse. Although no significant association was observed between duration or type of substance abuse and mucocutaneous manifestations, dermatological findings served as important clinical indicators of underlying substance use disorder. Early dermatological evaluation and multidisciplinary management may aid in timely diagnosis, intervention, and prevention of long-term complications.

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