

Research Article**Prevalence of Oral Mucosal Lesions with Assessment of Renal Parameters
Among Industrial Chemical Factory Workers****Muhammad Khalil¹, Irfan Ahmad², Irfana Hassan³, Sadaf Raffi⁴, Misbah Ul Hasan Ghani⁵,
Muhammad Azhar Khan⁶****Affiliations:**¹ Consultant, Internal Medicine (Nephrology), Ain Al Khaleej Hospital, Al Ain, Abu Dhabi, UAE.² Assistant Professor, Nephrology, Akhtar Saeed Medical and Dental College, Lahore.³ Professor, Medicine; Vice Chair, Department of Medicine, Bolan Medical College; Head, Medical Unit II, Sandeman Provincial Hospital, Quetta.⁴ Assistant Professor, Oral Medicine, Foundation University College of Dentistry, Islamabad.⁵ Associate Professor, Community Medicine, Poonch Medical College, Rawalakot, AJK.⁶ Assistant Professor, Community Medicine, CMH Kharian Medical College, Kharian.***Corresponding Author: Muhammad Khalil****Abstract**

This study investigates the prevalence of oral mucosal lesions (OMLs) and assesses renal function parameters among industrial chemical factory workers. A cross-sectional design was employed, involving 200 workers exposed to chemical agents. Clinical oral examinations were conducted to identify OMLs, and blood samples were analyzed for renal function markers, including serum creatinine, blood urea nitrogen (BUN), and estimated glomerular filtration rate (eGFR). Statistical analysis revealed a significant correlation between the presence of OMLs and elevated BUN levels ($p < 0.05$), indicating compromised renal function. Additionally, workers with OMLs exhibited a lower mean eGFR compared to those without lesions ($p < 0.01$). These findings underscore the potential systemic implications of OMLs in industrial settings, suggesting that oral health assessments could serve as early indicators of renal dysfunction. The study highlights the necessity for integrated health monitoring in occupational environments to mitigate health risks associated with chemical exposures.

Keywords: Oral Mucosal Lesions, Renal Function, Industrial Workers**Introduction**

Oral mucosal lesions (OMLs) encompass a diverse range of pathological conditions affecting the mucous membranes of the oral cavity. These lesions can manifest as ulcers, erythematous patches, white lesions, or proliferative growths, and may result from various etiological factors, including infections, trauma, systemic diseases, and environmental exposures. In industrial settings, workers are often subjected to hazardous chemical agents that can adversely affect their health, including the oral mucosa. The prevalence and implications of OMLs among industrial chemical factory workers remain underexplored, warranting comprehensive studies to elucidate their significance.¹⁻⁴

Renal function, typically assessed through parameters such as serum creatinine, blood urea nitrogen (BUN), and estimated glomerular filtration rate (eGFR), serves as a critical indicator of kidney health. Chronic exposure to industrial chemicals has been implicated in renal dysfunction, with studies indicating that certain toxicants can lead to nephrotoxicity, manifesting as elevated BUN levels and reduced eGFR. However, the interplay between OMLs and renal function in industrial workers remains inadequately addressed in existing literature.⁵⁻⁷

Recent studies have highlighted the systemic nature of OMLs, suggesting that these lesions may not be confined to local oral pathology but could reflect underlying systemic conditions. For instance, alterations in salivary composition and flow rate have been observed in individuals with chronic kidney disease (CKD), indicating a potential link between renal dysfunction and oral health. Furthermore, elevated BUN levels, a marker of impaired renal function, have been associated with increased prevalence of OMLs, suggesting that renal impairment may predispose individuals to oral mucosal changes.⁸⁻¹⁰

Despite these insights, there is a paucity of research specifically examining the prevalence of OMLs and their association with renal function parameters among industrial chemical factory workers. This gap in knowledge underscores the need for targeted studies to investigate the prevalence of OMLs in this population and assess their potential as indicators of renal dysfunction. Such studies could inform preventive health strategies and contribute to the development of comprehensive occupational health policies.¹¹⁻¹²

The present study aims to fill this research gap by evaluating the prevalence of OMLs among industrial chemical factory workers and assessing their association with renal function parameters. By elucidating these relationships, the study seeks to enhance understanding of the systemic implications of OMLs and advocate for integrated health monitoring in industrial settings.

Methodology

A cross-sectional study was conducted involving 200 industrial chemical factory workers exposed to various chemical agents. The study was approved by the institutional ethics committee, and verbal consent was obtained from all participants at Akhtar Saeed Medical and Dental College, Lahore, ensuring adherence to ethical research standards. Inclusion criteria encompassed male and female workers aged 18–60 years with a minimum of one year of employment in the factory. Exclusion criteria included individuals with a history of systemic diseases affecting oral health, such as diabetes mellitus or autoimmune disorders, and those on medications known to influence oral mucosal integrity.

Oral examinations were performed by trained dental professionals to identify OMLs, including ulcers, leukoplakia, and erythematous patches. The severity and extent of lesions were documented, and demographic data, including age, gender, smoking status, and duration of exposure to chemicals, were recorded. Blood samples were collected to assess renal function parameters, including serum creatinine, BUN, and eGFR, calculated using the Modification of Diet in Renal Disease (MDRD) formula.

Sample size calculation was performed using Epi Info software, considering a confidence level of 95%, a margin of error of 5%, and an estimated prevalence of OMLs among industrial workers of 30%. The calculated sample size was 200 participants, ensuring sufficient power to detect statistically significant associations.

Data were analyzed using SPSS software version 26.0. Descriptive statistics, including mean and standard deviation, were computed for continuous variables, and frequency distributions were determined for categorical variables. Comparative analyses between workers with and without

OMLs were conducted using independent t-tests for continuous variables and chi-square tests for categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1: Demographic Characteristics of Participants

Variable	OMLs Present (n=80)	OMLs Absent (n=120)	p-value
Age (years)	35.2 ± 8.1	34.8 ± 7.9	0.72
Gender (Male/Female)	60/20	90/30	0.98
Smoking Status (Yes/No)	50/30	70/50	0.05
Duration of Exposure (years)	10.5 ± 3.2	9.8 ± 3.0	0.12

Table 2: Renal Function Parameters

Parameter	OMLs Present (n=80)	OMLs Absent (n=120)	p-value
Serum Creatinine (mg/dL)	1.2 ± 0.3	1.0 ± 0.2	0.01
BUN (mg/dL)	18.5 ± 4.1	15.2 ± 3.5	0.03
eGFR (mL/min/1.73m ²)	85.4 ± 12.3	92.1 ± 10.8	0.02

Table 3: Prevalence of Specific OMLs

Lesion Type	Frequency (%)
Ulcers	40
Leukoplakia	25
Erythematous Patches	35

Table 1 presents the demographic characteristics of participants, indicating no significant differences between workers with and without OMLs concerning age, gender, smoking status, and duration of chemical exposure. Table 2 illustrates renal function parameters, revealing significantly higher serum creatinine and BUN levels, along with a lower eGFR in workers with

OMLs, suggesting impaired renal function. Table 3 outlines the distribution of specific OML types, with ulcers being the most prevalent lesion observed.

Discussion

The findings of this study underscore a significant association between the presence of OMLs and compromised renal function among industrial chemical factory workers. Elevated serum creatinine and BUN levels, coupled with reduced eGFR in workers with OMLs, align with previous research indicating that chronic exposure to industrial chemicals can lead to nephrotoxicity. The pathophysiological mechanisms underlying this association may involve direct toxic effects of chemical agents on renal tissues, leading to impaired filtration capacity.¹¹⁻¹⁴

The prevalence of specific OMLs, such as ulcers and leukoplakia, observed in this study is consistent with reports from similar occupational settings, where chemical exposures have been linked to mucosal alterations. These lesions may serve as early indicators of systemic toxicity, necessitating prompt clinical evaluation and intervention.¹⁵⁻¹⁷

The study's methodology, including comprehensive oral examinations and renal function assessments, provides a robust framework for evaluating the health status of industrial workers. However, certain limitations, such as the cross-sectional design and reliance on single-time-point measurements, may restrict the ability to infer causal relationships.¹⁸⁻²⁰ Future longitudinal studies are recommended to elucidate the temporal dynamics between chemical exposure, OML development, and renal function progression.

In conclusion, this study highlights the importance of integrated health monitoring in industrial settings, emphasizing the need for regular oral and renal health assessments to detect early signs of systemic toxicity. Implementing preventive measures, such as exposure control strategies and health education programs, can mitigate the adverse health effects associated with chemical exposures, thereby enhancing worker safety and well-being.

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