Research Article

Incidence and Risk Factors of Incontinence-Associated Dermatitis among Hospitalized Patients in a Tertiary Care Hospital in India

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Abstract

Introduction: Incontinence-associated dermatitis (IAD) is a common condition among hospitalized patients with incontinence, causing skin inflammation, erosion, and increasing the risk of pressure injuries. This study aims to estimate the incidence and identify risk factors of IAD in a tertiary care hospital in Western India.

Material and Methods: A prospective study was conducted from February 17, 2023, to February 20, 2024, in a tertiary care hospital in Western India. Among 3729 admitted patients, 700 developed urinary, stool, or combined incontinence after admission and were prospectively observed to estimate the incidence of IAD. In a case–control analysis, 234 IAD cases and 234 age and gender-matched controls (hospital-admitted patients without incontinence) were compared for socio-demographic characteristics, presence of co-morbidities, and medications being consumed to identify risk factors for IAD.

Results: The incidence of IAD among incontinent inpatients was 33.43/100 person-days, with an overall hospital-wide incidence of 5.28%. Univariate analysis showed that type of incontinence, length of hospital stay (odds ratio [OR] = 2.95, 95% confidence interval (CI) = 1.75–4.99, $P = 0.001$), diabetes mellitus (OR=2.08, 95% CI = 1.39–3.08; $P = 0.001$), use of antibiotics (OR = 11.44, 95% CI = 2.65–49.38; $P = 0.001$), laxatives (OR = 29.24, 95% CI = 17.71–48.2, $P = 0.001$), immunosuppressants (OR = 8.81, 95% CI = 3.67–21.12, $P = 0.001$), and corticosteroids (OR = 57.47, 95% CI = 30.37–108.76, $P = 0.001$) were significantly associated with IAD. Multivariate analysis identified the type of incontinence, comorbidities, and aforementioned medication use as independent risk factors for IAD.

Conclusion: Hospitalized patients with incontinence, especially those with a moderate to high Braden score, moderate to severe Katz Index of activities of daily living (ADL) dependency, prolonged hospitalization, diabetes, and multiple comorbidities and patients prescribed with antibiotics, laxatives, immunosuppressants, and corticosteroids had a higher risk of IAD. Targeted preventive strategies – including improved skin care protocols and careful management of identified risk factors – may significantly reduce the incidence and severity of IAD in hospitalized patients.

Keywords: Hospital inpatients, incidence, incontinence-associated dermatitis, risk factors

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Introduction

Incontinence-associated dermatitis (IAD) is a prevalent and clinically significant condition affecting hospitalized patients, particularly those with urinary or fecal incontinence.[1] It arises from prolonged exposure to moisture, urine, and feces, leading to skin inflammation, erosion, and increased susceptibility to infection, pain, and impaired quality of life.[2] The condition poses substantial challenges to patient

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care and increases the risk of secondary complications such as pressure injuries.[3]

In acute care settings, IAD prevalence ranges from 10% to 50%, influenced by patient demographics, comorbidities, and care practices.[4] Key risk factors include immobility, use of containment devices such as diapers, prolonged hospitalization, and underlying conditions such as diabetes mellitus and obesity, which compromise skin integrity and healing.[5] Medications such as antibiotics, corticosteroids, and immunosuppressants further elevate the risk by altering microbial balance and immune function.[6,7]

Despite the global recognition of IAD as a critical healthcare issue, there remains a significant gap in region-specific epidemiological data from India. While studies from Western and Southeast Asian countries have documented IAD incidence and risk profiles, no large-scale prospective study has been conducted in Indian tertiary care hospitals to determine the incidence of IAD to systematically evaluate its associated risk factors.

This study addresses this critical knowledge gap by estimating the incidence of IAD and identifying modifiable and non-modifiable risk factors among incontinent patients in a major tertiary care hospital in Western India. The findings are expected to inform evidence-based nursing interventions, enhance preventive strategies, and support the development of localized skin care protocols tailored to the Indian healthcare context.

Materials and Methods

Study design and participants

In this prospective study conducted in a private tertiary care hospital in Mumbai in Western India, a total of 3729 hospital inpatients from February 17, 2023, to February 20, 2024, were evaluated to identify cases of urinary, fecal, or combined incontinence. Among these, 700 patients from various inpatient units such as medical, surgical, oncology, and intensive care unit (ICU) who developed either urinary or stool incontinence or both were recruited into a prospective cohort study after informed consent.

Patients who developed urinary, stool, or combined stool/urinary incontinence during the stay in PD Hinduja National Hospital, Mumbai, and who had been hospitalized for at least 24 h were included in the study. Patients availing care from the outpatient department, Accident and Emergency, Day Care centers, and facility; patients who had IAD at the time of admission; patients with colostomy or other intestinal diversions; and patients with a urinary catheter were excluded from the study.

The 700 recruited patients with incontinence enrolled in the cohort study were examined daily from day 1 to day 10 or until discharge by a wound care nurse. The wound care nurse carried out a physical examination of all the enrolled cases of incontinence in the wards and ICU and recorded the diagnosis of incident cases of IAD.

For identification of the risk factors associated with IAD, a case–control analysis was performed. Cases were patients with incontinence who developed dermatitis ($n = 234$). From the remaining 466 patients with incontinence, but who did not develop IAD, 234 age and gender-matched patients were selected as controls. Data on risk factors such as patients' socio-demographic characteristics (age, gender, body mass index [BMI], diagnosis, dates of admission and discharge, discharge location, and activities of daily living [ADL] status); clinical profile (type of incontinence, frequency, stool characteristics, number of diapers used within the last 24 h, and average time taken to respond for cleaning the affected area); and details of the medication received (name of the medication, dosage, frequency and duration of antibiotics, laxatives, diuretics, immunosuppressant, and corticosteroids) were compared between 234 cases and 234 controls.

Ethical approval for the study was obtained from the Institutional Ethics Committee (IEC-II [IRB]/1561/AL/23/36). Informed consent was obtained from all 700 patients in the prospective phase, while a waiver of consent was granted for the data extracted from medical case records of the remaining 3029 patients for the risk factor analysis study by the Institutional Ethics Committee.

Data analysis tools and statistical analysis

Data were entered in the Microsoft Excel spreadsheet customized for the study purpose. Data analysis was done using Stata (version 13.1). Incidence of IAD was estimated by taking the number of cases who developed IAD during the period of follow-up as the numerator and the total person time of follow-up in days as the denominator.

Univariate regression analysis explored associations between various risk factors and IAD outcome, and subsequently, logistic regression analysis was performed to identify risk factors that were independently associated with IAD. Comparisons were done between the sub-groups based on demographic variables such as age, sex, diagnosis, length of stay and admitted location, and the risk factors contributing to IAD. Associations between categorical variables and sub-group were test. Proportions were compared between the sub-groups using Chi-square test.

Results

Among the 3729 patients hospitalized during the time frame of February 17, 2023 to February 20, 2024, 700 developed urinary, stool, or combined incontinence, with 234 of them subsequently developing IAD.

The incidence of IAD among incontinent patients was notably high at 33.43/100 person-days, whereas the overall hospital-wide incidence was 5.28%. Incidence rates were similar between males and females (~16%), but patients over 45 years exhibited a substantially higher incidence – almost 15 times greater than younger patients [Table 1].

Univariate analysis identified significant associations of IAD

Table 1: Incidence of IAD among the inpatients having urinary or stool incontinence

Population and study characteristics	Description	New cases of IAD during hospitalization (*n*=234)	Incidence of IAD per 100 person days of observation (*n*=700)
Day of observation	Day 1	68	9.7
	Day 2	81	11.6
	Day 3	40	5.7
	Day 4 and above	45	4.43
	Total	234	33.43
Type of incontinence	Urinary	19	2.71
	Stool	111	15.86
	Combined	104	14.86
	Total	234	33.43
Gender	Females	118	16.86
	Males	116	16.57
	Total	234	33.43
Age	≤45 years	19	2.71
	>45	215	30.71
	Total	234	33.42

IAD: Incontinence-associated dermatitis

with stool and combined incontinence types; moderate to severe Braden scores; greater dependency in ADL (Katz index); hospitalization beyond 15 days; diabetes; other comorbidities; and use of antibiotics, laxatives, immunosuppressants, and corticosteroids. No significant associations were found for BMI, admission reason (medical vs. surgical), inpatient location (ICU vs. ward), or some comorbidities such as asthma and hypertension. Multivariate logistic regression confirmed stool and combined incontinence, presence of comorbidities, and use of antibiotics, laxatives, corticosteroids, and immunosuppressants as independent risk factors for IAD [Table 2].

These key findings highlight the vulnerability of incontinent patients – especially older adults and those with multiple comorbidities or on certain medications – to developing IAD during hospitalization. The results underscore the importance of targeted monitoring and tailored nursing interventions such as skin care protocols and risk-factor mitigation to reduce IAD incidence and improve patient outcomes among incontinent patients.

Discussion

The study's findings provide important insights into the incidence of IAD among hospitalized patients with urinary, stool, or combined incontinence, highlighting a substantially higher risk in incontinent versus non-incontinent patients.

Consistent with global reports, the incidence observed aligns with varied rates internationally, where IAD prevalence reportedly ranges widely by setting and population demographics. Among non-ICU settings, it was reported to be 21.30%, 19.00%, 20.67%, 50.00%, and 6.89% in the United States, Canada, Thailand, Australia, and Turkey, respectively, whereas it was reported to range between 6.89 and 50% in ICU patients.[8-11] We observed the incidence of IAD among patients with incontinence to be 33.43/100 person-days in our study. In contrast, the overall incidence of IAD in hospitalized non-incontinence inpatients during the same period was 6.2/100 person days (234/3729). This strongly highlights the need for careful monitoring of inpatients to identify IAD patients early and implement diligent nursing care to prevent IAD-associated complications, morbidity, and prolongation of hospital stay.

We observed IAD more commonly in elderly people with an incidence rate of 30.71 cases/100 person-days among patients aged over 45 years. Other studies have reported that 35.4% to 47.7% of elderly people with incontinence also develop IAD.[12-14] This might be resulting from higher vulnerability to IAD among older people with skin damaged by ageing.

Previous studies have reported no gender-specific susceptibility to IAD and significant differences in the incidence of IAD among men and women.[15] We also observed a comparable incidence rate of 16 cases/100 person-days among our study participants of both genders.

Individuals with dual incontinence, that is those experiencing both urinary and fecal incontinence, have been reported to have a 1.92 to 4.99 times greater risk of developing pressure injuries acquired in healthcare facilities compared to those without incontinence.[16,17] We observed that among patients who developed incontinence during their hospital stay had nearly fivefold higher incidence of dermatitis compared to those who did not develop incontinence.

Several clinical factors – including type of incontinence, Braden risk score, ADL dependency, prolonged hospital stay, diabetes, comorbidities, and use of medications such as antibiotics, laxatives, immunosuppressants, and corticosteroids – were associated with increased IAD risk. These associations could reflect underlying mechanisms such as compromised skin integrity, immunosuppression, and prolonged exposure to irritants and moisture.[18] However, causal inference should be approached cautiously due to study design limitations.

The study's strengths include a robust prospective cohort with matched controls within an Indian tertiary care context, addressing a regional research gap. Our study provides specific evidence which might be very useful in planning appropriate strategies for IAD prevention and control among patients with urinary, stool, or dual incontinence. Nursing management of inpatients should focus on being more watchful among elderly people suffering from stool or urine and combined incontinence. Appropriate interventions such as shifting positions, avoiding prolonged resting on pressure points, and use of skin moisturizers must be instituted. It is also important to be more watchful in patients requiring prolonged hospitalization, patients on extensive technological support limiting free movement in the bed, and patients on medications such as antibiotics, immunosuppressants, corticosteroids, and laxatives. Our study highlights the importance of instituting nursing measures for qualitative and quantitative improvement in patients suffering from incontinence who are at higher risk of developing AID.

Table 2: Results of univariate and multivariate logistic regression analysis showing risk factors for IAD

Variables	IAD				Univariate logistic regression analysis		Multivariate logistic regression analysis	
	Cases (*n*=234)		Controls (*n*=466)					
	N	%	N	%	Odds ratio (95% CI)	*P* value	Odds ratio (95% CI)	*P* value
Reason for admission								
Medicine	132	56.65	96	50.79	1	Ref.		
Surgery	101	43.35	93	49.21	1.15 (0.79–1.67)	0.45		
Type of incontinence-stool, urinary, combined								
Urinary	19	25.3	56	74.7	1	Ref.	1	Ref.
Stool	110	52.1	101	47.9	5.73 (3.27–10.03)	**0.0001**	212.754 (5.91-104.88)	**0.0034**
Combined	104	76.5	32	23.5	17.11 (9.02–32.13)	**0.0001**	7.05 (0.47-104.88)	0.1562
Braden score								
No risk	1	1.3	74	98.7	1	Ref.	1	Ref.
Mild risk	0	0	50	100	0	0.997	0	0.9991
Moderate risk	9	9.9	82	90.1	8.12	**0.0495**	21128.51	0.9995
High or severe risk	223	89.2	27	10.8	611.18 (81.63–4576.1)	**0.0001**	2240000	0.999
Katz index of ADL								
Independent	1	0.43	98	42.06	1	Ref.	1	Ref.
Moderate dependent	75	32.19	119	51.07	61.76 (8.43–452.32)	**0.0001**	0.0002	0.9996
Very dependent	157	67.38	16	6.87	961.63 (125.54–7366.09)	**0.0001**	0.0001	0.9996
Length of stay								
≤15 days	176	75.54	210	90.13	1	Ref.	1	Ref.
>15 days	57	24.46	23	9.87	2.95 (1.75–4.99)	**0.0001**	1.69 (0.19–14.38)	0.63
Admitted location								
Ward	112	45.7	133	54.3	1	Ref.		
ICU	121	54.8	100	45.2	1.43 (0.99–2.07)	0.0517		
BMI								
Normal	0	0	16	6.87	1	Ref.		
Obese	178	76.39	169	72.53	1.93E+09	0.99		
Overweight	55	23.61	46	19.74	2.19E+09	0.99		
Clinical presentation - DM								
No	58	24.89	95	40.77	1	Ref.	1	Ref.
Yes	175	75.11	138	59.23	2.08 (1.39–3.09)	**0.0003**	0.5 (0.08–2.94)	0.444
Clinical presentation - Asthma								
No	227	97.42	219	93.99	1	Ref.		
Yes	6	2.58	14	6.01	0.41 (0.15–1.09)	0.08		
Clinical presentation - Cancer								
No	221	94.85	215	92.27	1	Ref.		
Yes	12	5.15	18	7.73	0.65 (0.31–1.38)	0.26		
Clinical presentation - Cardiac ailment								
No	228	97.85	220	94.42	1	Ref.		
Yes	5	2.15	13	5.58	0.37 (0.13–1.06)	0.06		
Clinical presentation - HTN								
No	98	42.06	83	35.62	1	Ref.		
Yes	135	57.94	150	64.38	0.76 (0.52–1.11)	0.15		
Clinical presentation - Other comorbidities								
No	229	98.28	204	87.55	1	Ref.	1	Ref.
Yes	4	1.72	29	12.45	0.12 (0.04–0.36)	**0.001**	0.0018 (0.0001–0.0515)	**0.0002**
Medications - Use of antibiotics								
No	2	0.86	21	9.01	1	Ref.	-	-
Yes	231	99.14	212	90.99	11.44 (2.65–49.38)	**0.0011**	594.09 (8.04–43894)	**0.0036**
Medications - Use of laxative								
No	33	14.16	193	82.83	1	Ref.	1	Ref.
Yes	200	85.84	40	17.17	29.24 (17.71–48.29)	**0.0001**	181.23 (16.47–1994)	0.0001
Medications - Use of immunosuppressant								
No	189	81.12	227	97.42	1	Ref.	1	Ref.
Yes	44	18.88	6	2.58	8.81 (3.67–21.12)	**0.0001**	144.28 (5.35–3892.43)	**0.0031**
Medications - Use of corticosteroid								
No	53	22.75	220	94.42	1	Ref.	1	Ref.
Yes	180	77.25	13	5.58	57.47 (30.37–108.76)	**0.0001**	2293.39 (94.51–55652)	**0.0001**
Medications - Use of diuretics								
No	109	46.78	153	65.67	1	Ref.	1	Ref.
Yes	124	53.22	80	34.33	2.18 (1.49–3.16)	**0.0001**	275.76 (10.55–7207.94)	**0.0007**

DM: Diabetes mellitus, HTN: Hypertension, ADL: Activities of daily living, BMI: Body mass index, ICU: Intensive care unit, OR: Odds ratio, CI: Confidence interval. Bold value: *P* value significant

Future research could explore multicenter prospective studies to validate these findings across diverse healthcare settings in India, as well as interventional studies to assess the effectiveness of specific nursing

protocols and skin care bundles in reducing IAD incidence and severity.

Limitations

The study utilized a purposive sampling from selective wards of our hospital, which might have introduced some level of selection bias and hence would limit the generalizability of the findings. This single-center study may restrict the applicability of the results to other healthcare facilities or diverse patient populations.

Conclusion

This study is the first to report the incidence of IAD in a tertiary care hospital in Western India. IAD was significantly associated with stool or mixed incontinence; moderate to severe Braden scores; moderate to total dependence as per the Katz Index of ADL; prolonged hospitalization (>15 days); diabetes mellitus; other comorbidities; and the use of antibiotics, laxatives, immunosuppressants, and corticosteroids. These findings highlight the need for targeted preventive strategies among high-risk patients. Early identification, timely intervention, and the implementation of standardized skin care protocols may play a critical role in reducing IAD-related morbidity and minimizing extended hospital stays.

Conflict of Interest

N/A.

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