DOI: 10.7860/JCDR/2025/76696.20705

Original Article

Dermatology Section

Factors Determining Mortality in Stevens Johnson Syndrome and Toxic Epidermal Necrolysis: A 10 Year Retrospective Analysis from a Tertiary Care Centre in Southern India

DEEPTHY V GOPINATH[1], PRADEEP S NAIR[2]

ABSTRACT

Introduction: Stevens-Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) are severe cutaneous adverse drug reactions characterised by high fever, widespread blistering exanthema, and atypical target lesions accompanied by mucosal involvement. SJS/TEN ranks among the leading causes of mortality in dermatology. Adequate management of these conditions requires prompt recognition, identification of risk factors and timely intervention. Due to the rarity of these incidents, their mortality rates and the associated factors are less studied.

Aim: To determine the factors contributing to mortality in SJS and TEN, as well as, the mortality rate in a tertiary care centre.

Materials and Methods: The present single-centre retrospective observational study was conducted in the Department of Dermatology and Venereology, Government Medical College, Thiruvananthapuram, Kerala, India, from November 2022 to May 2023. Data were extracted from the case records of patients diagnosed with SJS/TEN over a period of 10 years, from January 2012 to December 2021. The variables studied included patients' age, gender, suspected drug, interval between drug intake and onset of symptoms, time interval between the development of the rash and reporting to a healthcare facility, associated co-morbidities, involved Body Surface Area (BSA), duration of hospitalisation, laboratory investigations, and complications, including death. The data were analysed using the trial version of Statistical Package for Social Sciences (SPSS) software version 29.0. A Pearson's two-sided Chi-square test was utilised to determine the statistical significance of the variables between the survival group and the mortality group.

Results: A total of 146 cases of SJS/TEN were analysed, of which the mean±Standard Deviation (SD) age in the survived group was 42.07±16.704 years, while in the mortality group, it was 67.83±7.57 years (p-value=0.003). There were eight cases of mortality (5.48%). The most common drug in both the mortality group and the survival group was phenytoin. There was a statistically significant association between age (p-value=0.003), Hypertension (HT) (p-value=0.002), presentation with vesicles and bullae (p-value=0.002), and mortality. TEN was more likely to cause mortality than SJS (p-value=0.001), and urinary microscopy abnormalities were associated with mortality (p-value=0.04).

Conclusion: A low mortality rate of 5.48% was observed in the present study. Older age, hypertension, presentation with vesicles and bullae, and urinary microscopy abnormalities contributed to mortality. Phenytoin was more likely to cause mortality than other drugs. Mortality was higher in TEN compared to SJS.

Keywords: Adverse drug reaction, Body surface area, Lyell's disease, Mortality in dermatology

INTRODUCTION

Conditions like SJS and TEN are classified as severe cutaneous adverse drug reactions with considerable morbidity and mortality. Phenytoin, carbamazepine, penicillins, sulphonamides, allopurinol and piroxicam are the most common drugs implicated in India [1]. Both SJS and TEN belong to the same disease spectrum, with TEN being more severe. Both present with vesicles, bullae and severe mucosal involvement, while TEN additionally presents with epidermal detachment, characterised by a 'charred appearance' and purpuric spots. SJS/TEN can lead to mortality, and if patients survive, eye damage and blindness can occur as sequelae [2]. Total BSA involvement, along with co-morbidities such as HT, Diabetes Mellitus (DM) and malignancy, may contribute to mortality. The usual causes of mortality are Acute Respiratory Distress Syndrome (ARDS), acute renal failure, septicaemia and bronchopneumonia. Mortality for SJS ranges from 19.4-29%, while for TEN it varies from 14.8-48% in foreign studies and from 7.1-12.94% in Indian studies, respectively [1-5].

There are very few studies in India focusing on the factors contributing to mortality in these serious drug reactions [5,6]. Hence, the primary objective of the present study was to analyse the factors determining mortality in SJS/TEN and the mortality rate in a tertiary care centre.

MATERIALS AND METHODS

The present single-centre retrospective observational study was conducted in the Department of Dermatology and Venereology, Government Medical College, Thiruvananthapuram, Kerala, India. Data spanning 10 years, from January 2012 to December 2021, were retrieved from the case sheets of the central records library at this centre after a computer search using the following terms: SJS, TEN, and drug reactions. After obtaining permission from the Institutional Research and Ethical Committee (HEC No. 09/03/2022/MCT), the retrieved data were entered into a preformatted proforma and analysed over a period of six months, from November 2022 to May 2023.

Inclusion criteria: Fully documented and completed case records of diagnosed cases of SJS/TEN, including investigations were included in the study. The diagnosis of SJS/TEN entered in the case records was based on the Bastuji-Garin criteria: <10% BSA for SJS, 10-30% for SJS/TEN overlap, and >30% for TEN [3].

Exclusion criteria: Incomplete case records and those with incomplete investigations were excluded from the study.

Study Procedure

Age and gender were the demographic variables retrieved from the case records. The data regarding co-morbidities analysed included HT, diabetes, Human Immunodeficiency Virus (HIV), atopy and malignancy. The drug variables included past history of drug reactions, whether single or multiple drugs were taken, mode of intake, duration of the drug reaction, days elapsed before being referred to this centre, total duration of stay in the hospital, and the most probable drug causing the adverse reaction.

The data regarding clinical variables retrieved from the case sheets included the presence of vesicles or bullae, erosions/crusting, presence of epidermal detachment, purpuric spots, and involvement of the eyes, oral cavity, and genital mucosa, as well as, approximate total body surface involvement. Data regarding the immediate cause of mortality were also retrieved. The mortality rate was calculated as follows: the total number of SJS/TEN patients who died during the study period divided by the total number of SJS/TEN patients in the study period, multiplied by 100.

Data regarding investigations retrieved included: blood routine tests, urine routine tests {(albumin, pus cells and Red Blood Cells (RBCs)}, Liver Function Tests (LFT) {normal range: Serum Glutamic Oxaloacetic Transaminase (SGOT): 12-38 IU/L, Serum Glutamic Pyruvate Transaminase (SGPT): 7-41 IU/L}, Renal Function Tests (RFT) (normal range: urea: 15-35 mg/dL, creatinine: 0.6-1.4 mg/dL), serum sodium (136-145 mM/L), potassium (3.6-5.4 mM/L), bicarbonate (>20 mM/L), and random blood sugar levels (<200 mg%). The reference values for the above-mentioned parameters are based on the standard Institutional laboratory values.

STATISTICAL ANALYSIS

The data retrieved were entered into an Excel sheet and analysed using the trial version of SPSS software version 29.0. Qualitative data were expressed as proportions or percentages. Quantitative variables were expressed as means and standard deviations. Frequency distribution analysis and descriptive statistics were calculated for nominal and ratio data, respectively. Risk factors for mortality in SJS/TEN were analysed using logistic regression in both univariate and bivariate models. The Pearson's two-sided Chi-square test was utilised to determine the statistical significance of the variables between the survival group and the mortality group, with a p-value of <0.05 considered statistically significant.

RESULTS

The present 10-year retrospective observational study (2012 to 2021) analysed 146 cases (N=146) of SJS/TEN during the study period. There were eight cases of mortality in the present study, accounting for a mortality rate of 5.48%. The mean±SD age in the survived group was 42.07±16.704 years, while in the mortality group, it was 67.83±7.57 years, which was statistically significant (p-value=0.003). The youngest age in the mortality group was 19 years, and the oldest was 79 years, while in the survived group, the youngest was 14 years, and the oldest was 77 years. In both groups, females outnumbered males, but this was not statistically significant [Table/Fig-1].

Parameters		Died	Survived	p-value
Age (years) (mean±SD)		67.83±7.574	42.07±16.704	0.003*
Gender, n (%)	Male	2 (25)	57 (41.3)	0.361
	Female	6 (75)	81 (58.7)	

[Table/Fig-1]: Demographic parameters in the died and survived group.
*The p-value <0.05 was considered statistically significant

There were no malignancies in the mortality group, while there were 4 (2.9%) cases in the survived group. The salient demographic and drug details in the mortality group are provided in [Table/Fig-2]. The salient clinical features in the mortality group are provided in [Table/Fig-3]. The relevant investigation details in the mortality group are given in [Table/Fig-4]. The salient features in the survived group are presented in [Table/Fig-5].

Case no.	Age (years)	Gender	Past history of drug reaction	History of atopy/ HIV	History of Diabetes (DM)/ Hypertension (HT)	Total duration of disease in days	Days elapsed before referral to present institute	Duration of stay in hospital in days	Single/multiple drugs	Drug implicated	Mode of intake
1	79	Female	Yes, analgesics (drug not known)	Nil	HT	3	0	7	Single	Diclofenac	Oral+Parentral
2	73	Female	No	Nil	HT	8	3	18	Multiple	Diclofenac Ciprofloxacin Paracetamol	Oral+Parentral
3	65	Male	No	Nil	HT+DM	9	5	9	Single	Phenytoin	Oral
4	19	Female	Yes, paracetamol	Nil	Nil	18	2	18	Single	Phenytoin	Oral
5	70	Female	No	Nil	Nil	10	1	10	Multiple	Ofloxacin Ornidazole Acelofenac	Oral
6	60	Female	No	Nil	HT	24	0	24	Multiple	Allopurinol Piroxicam	Oral
7	60	Female	No	Nil	Nil	10	0	10	Single	Phenytoin	Oral
8	76	Male	No	Nil	HT+DM	1	0	8	Multiple	Levadopa Carbidopa	Oral

[Table/Fig-2]: Salient demographic and drug history details in the mortality group (n=8).

Case no.	Vesicle/ Bulla	Epidermal detachment with charring	Purpuric spots	Erosions/ crusting	Distribution: Face (F), Upper Limb (UP), Trunk (T), Lower Limb (LL)	Mucous membrane involvement: Eyes (E)/ Oral (O)/Genital (G)	Body surface involvement	Final diagnosis	Admitted in ICU/ General Ward (GW)	Cause of death
1	Present	Absent	Present	Nil	T+LL	O	70%	TEN	GW	Renal failure
2	Present	Present	Absent	Present	F+UL+T+LL	O+G	90%	TEN	GW	ARDS
3	Present	Absent	Absent	Present	UL+T+LL	E	60%	TEN	ICU	Renal failure, septicaemia
4	Present	Absent	Present	Present	F+UL+T+LL	E+O+G	80%	TEN	GW	Septicaemia
5	Present	Absent	Present	Present	F+UL+T+LL	E+O	70%	SJS	GW	Septicaemia

6	Present	Absent	Present	Present	UL+T+LL	E+O	70%	TEN	GW	Renal failure, septicaemia
7	Present	Absent	Present	Nil	F+UL+T+LL	E+O+G	70%	TEN	GW	Septicaemia
8	Present	Absent	Present	Present	F+UL+T+LL	E+O+G	80%	TEN	GW	Septicaemia

[Table/Fig-3]: Salient clinical details in the mortality group.
ICU: Intensive care unit; ARDS: Acute respiratory distress syndrome (n=8)

Case no.	Blood routine	Urine routine	SGOT (IU/litre)	SGPT (IU/litre)	Urea (mg/dL)	Creatinine (mg/dL)	Sodium (mMol/L)	Potassium (mMol/L)	Bicarbonate (mMol/L)	RBS (mg%)
1	TC-2600	Normal	39	26	37	0.9	151	4.3	18	155
2	TC-4000 Hb-9.2	Normal	68	20	32	1.1	139	3.9	24	167
3	Hb-9.6	Pus cells+, RBC+, albumin	58	44	216	6.8	120	4.1	22	267
4	Normal	Albumin+, pus cells+	46	27	20	0.9	129	4.5	21	103
5	Normal	Albumin+, pus cells+	68	55	33	1.1	124	4.2	19	130
6	Hb-7.4	Albumin+, pus cells+	30	22	123	4.1	126	4.8	21	78
7	Normal	Glucose levels+	108	61	25	0.9	121	4.1	18	102
8	Normal	RBC+, pus cells+, albumin	56	38	27	1.2	134	4.2	22	144

[Table/Fig-4]: Salient laboratory parameters in the mortality group (n=8).
TC: Total count (cells/mm^3); Hb: Haemoglobin (%)

Age (mean±SD) (years)	Gender	History of atopy/ HIV	Co-morbidities DM/HT	Mean duration of disease in days	Commonest drug implicated	No. of cases with Epidermal detachment/ Purpuric spots	Mean Body Surface Area (BSA) involvement	Mean number with Eyes/ Oral/Genital involvement	Commonest distribution	Admitted in ICU/ General Ward (GW)	Final diagnosis
42.07±16.704	Males-57 Females-81	Atopy-14 HIV-1	DM-18 HT-25	3.23	Phenytoin-36 Carbamazepine-16 Penicillins-9	Epidermal detachment-84 Purpuric spots-45	60%	Eyes-113 Oral-124 Genitals-69	Upper limb+ trunk+lower limb-67	ICU-4 GW-134	SJS-40 SJS, TEN overlap-51 TEN-47

[Table/Fig-5]: Salient features in the survived group of SJS/TEN (n=138).
Values presented as frequency (n); DM: Diabetes; HT: Hypertension

Prior drug reaction history was present in 25% of the mortality group and 11.6% of the survived group (p-value=0.262). The total duration of the disease from the onset of taking the offending drug and the time spent in the hospital were not contributory to mortality (p-value=0.710) in the present study [Table/Fig-6]. Most patients were on multiple drugs when they developed the rash, making it difficult to pinpoint a particular drug as the cause. In some cases, no drugs could be implicated. Most prescriptions that led to the disease included antibiotics and analgesics. However, phenytoin (n=42) was found to be the most common drug in both the survived and mortality groups [Table/Fig-7].

Parameters	Died, n=8	Survived, n=138	p-value
Previous history of drug intake, n (%)	2 (25)	16 (11.59)	0.262
Single drug, n (%)	2 (25)	114 (82.6)	0.550
Multiple drugs, n (%)	6 (75)	24 (17.39)	
Mode of drug intake, n (%)	Oral-6 (75) Parenteral-0 Oral+parenteral-2 (25)	Oral-110 (79.71) Parenteral-20 (14.49) Oral+parenteral-8 (57.97)	0.360
Duration of drug reaction (n)	<1 day-0 1-3 days-4 4-6 days-1 7-9 days-2 10-12 days-1 13-15 days-0 16-18days-0 19-21 days-0	<1 day-1 1-3 days-43 4-6days-55 7-9 days-19 10-12 days-7 13-15 days-10 16-18days-1 19-21 days-2	0.715
Duration before being referred (n)	<1 day-2 2 days-3 3 days-1 4 days-0 >4 days-2	<1 day-15 2days-77 3 days-10 4 days-10 >4 days-26	0.720
Total duration of hospital stay (days) (mean±SD)	13±6.573	13.17±5.929	0.710

[Table/Fig-6]: Drug variables and other parameters studied in survived and died group.

Drug	Type	Frequency (n)
Antibiotic	Penicillins	16
	Fluoroquinolones	14
	Macrolides	5
Anticonvulsants	Phenytoin	42
	Carbamazepine	18
Paracetamol	-	33
Analgesics	Diclofenac	13
	Etoricoxib	7
	Mefenamic acid	5
	Piroxicam	4
	Aceclofenac	3
Allopurinol	-	9
Others	IV contrast media	1
	Dapsone	1
	Nevirapine	1
	Fluconazole	2

[Table/Fig-7]: The drugs implicated to cause SJS/TEN in the study.

The co-morbidity parameters with significance in both the survived and mortality groups are provided in [Table/Fig-8]. Two cases (25%) in the mortality group and 25 cases (18.11%) in the survived group had diabetes. In the survived group 24 (17.39%) cases and 5 (62.5%) cases in the mortality group had hypertension (p-value=0.002).

Parameters	Survived, n=138	Died, n=8	p-value
Atopy, n (%)	14 (10.1)	0	0.570
HIV, n (%)	1 (0.7)	0	0.809
Malignancy, n (%)	11 (7.9)	0	0.559
Diabetes, n (%)	25 (18.1)	2 (25)	0.961
Hypertension, n (%)	24 (17.3)	5 (62.5)	0.002*

[Table/Fig-8]: Co-morbidities in survived and died group.
*The p-value <0.05 was considered statistically significant

Investigative parameters with significance are presented in [Table/Fig-9]. Only deranged urine microscopy was significantly associated with mortality (p-value=0.04). The most common probable drug in the mortality group and the survived group was phenytoin, with 3 (33.3%) cases in the mortality group and 36 (26.09%) cases in the survived group, respectively. In the survived group, 113 (81.88%) cases had eye involvement, 124 (89.85%) cases had oral involvement, and 69 (50%) cases had genital involvement, while in the mortality group, eye involvement was seen in 6 (75%) cases, oral involvement in 7 (87.5%) cases and genital involvement in 50% (4 cases) (p-value=0.774, 0.404, 0.467, respectively). Vesicles and bullae, along with phenytoin and TEN, were significantly associated with mortality (p-value <0.05) [Table/Fig-10]. However, epidermal detachment, purpuric spots, and erosion/crusting were not associated with mortality (p-value >0.05) [Table/Fig-11].

Parameters	Survived, n=138	Died, n=8	p-value
Deranged haemogram, n (%)	11 (7.9)	3 (37.5)	0.736
Deranged LFT, n (%)	49 (35.5)	5 (62.5)	0.784
Deranged RFT, n (%)	110 (79.7)	4 (50)	0.660
Deranged sodium, n (%)	72 (52.1)	5 (62.5)	0.570
Deranged potassium, n (%)	4 (2.8)	0	0.425
Deranged bicarbonate, n (%)	17 (12.31)	3 (37.5)	0.801
Deranged urine microscopy (+RBC, pus cells and albumin), n (%)	42 (30.4)	5 (62.5)	0.04*

[Table/Fig-9]: Investigation parameters in survived and mortality group.

Parameters	Survived, n=138	Died, n=8	p-value
Vesicles and bullae, n (%)	60 (43.4)	8 (100)	0.002*
Phenytoin, n (%)	36 (26)	3 (37.5)	0.004*
Urine microscopy, n (%)	42 (30.4)	5 (62.5)	0.04*
TEN, n (%)	47 (34)	7 (87.5)	0.001*

[Table/Fig-10]: Important parameters with significance, TEN: Toxic epidermal necrolysis (increased mortality when compared with SJS).

Parameters	Survived, n=138	Died, n=8	p-value
Epidermal detachment, n (%)	84 (60.8)	6 (75)	0.424
Purpuric spots, n (%)	45 (32.6)	3 (37.5)	0.775
Erosions/crusting, n (%)	96 (69.5)	6 (75)	0.745
BSA (%), n (%)	60 (43.4)	7 (87.5)	0.140
Treated in general ward, n (%)	134 (97.8)	7(87.5)	0.147

[Table/Fig-11]: Parameters without significance.
BSA: Body surface area. The last parameter shows admission numbers in general ward compared to Intensive Care Unit (ICU).

All the patients were treated with systemic steroids (betamethasone), antibiotics, and supportive measures. In the mortality group, 7 (87.5%) cases and 134 (97.8%) in the survival group were managed in the general wards. Four patients died of septicaemia; two died of septicaemia and renal failure, one died due to ARDS and another died due to renal failure.

DISCUSSION

The present retrospective case record-based observational study demonstrated a mortality rate of 5.48% in cases of SJS/TEN, one of the lowest in similar studies worldwide. Mortality figures in foreign studies range from 15.4-48%, while in Indian studies, they range from 8.10-28.20% [4-7]. Moreover, the majority of the survivors (96.37%) in the present study were managed in general wards rather than in the Intensive Care Unit (ICU). This contrasts with most advanced centres in the world, where SJS/TEN is managed in burn wards and ICUs, yet they have a much higher mortality rate compared to the present study and other Indian studies [8,9]. The exact cause for this discrepancy cannot be explained, other than by racial and biological factors. A study in the United States indicated greater mortality in the Hispanic population compared to the non hispanic white population (p-value=0.05), suggesting racial and biological influences [4]. However, in the present study, the management in the ICU or general ward did not determine the final clinical outcome regarding survival or mortality (p-value=0.147). In cases of TEN, where there is epidermal detachment with erosions and crusting, skin barrier function is lost; thus, it is preferable to manage these patients in ICU units or burn wards to ensure better barrier nursing and patient care [8]. This may not be feasible in most centres in India due to limited resources, as patients from the Medicine Department are often given priority in these units.

The mean age in the mortality group was higher than in the survival group, and this difference was significant (p-value=0.003). This aligns with the study by Noe MH et al., which found that increasing age significantly contributes to mortality [8]. Age is a contributing factor in mortality for SJS/TEN and is one parameter in Severity-of-illness Score for Toxic Epidermal Necrolysis (SCORTEN), where an age greater than 40 years receives 1 point [3]. Age is also one of the parameters in the ABCD-10 model (A-age, B-bicarbonate, C-cancer, D-dialysis, 10-10% BSA) for predicting mortality in SJS/TEN [8]. Older individuals may have co-morbidities such as diabetes, hypertension and cardiac problems, which contribute to mortality [9].

Females were the majority in both the survival and mortality groups, but this was not significant (p-value=0.361). This finding is consistent with other studies [10,11]. The exact factors responsible for the increased frequency of SJS/TEN and mortality in females have not been elucidated, but they may involve biological factors.

The past history of drug reactions in the index patient was not contributory to mortality in the present study (p-value=0.262). The total duration of the disease from the onset of taking the offending drug and the time spent in the hospital was not contributory to mortality in this study (p-value=0.710). This observation is consistent with the studies by Thakur V et al., and Kanagarajan A et al., in India [12,13]. However, prolonged hospital stay contributing to mortality has been reported in other studies [12-14]. Prolonged hospital immobilisation may be complicated by pneumonia and septicaemia in SJS/TEN, where the barrier functions of the skin are already compromised, leading to mortality [15].

An interesting finding in the present study is the association of HT as a co-morbidity contributing to mortality, which was significant (p-value=0.002). We could not find any study with a similar finding. Other studies have linked co-morbidities such as DM, HIV, tuberculosis and cutaneous autoimmune diseases as risk factors for mortality [16,17]. DM was not a significant co-morbidity in the current study (p-value=0.961).

Another important highlight of the present study was that the presentation of TEN with vesicles and bulla predominantly contributed to mortality (p-value=0.002), rather than epidermal detachment with charring (p-value=0.424) and purpuric spots (p-value=0.775). This contrasts with other studies where epidermal detachment had a worse prognosis in TEN [14,15,18,19]. The vesicles and bulla in SJS/TEN are rich in electrolytes such as sodium, potassium, bicarbonate and chloride. The subsequent rupture of these blisters results in the loss of these vital electrolytes, leading to an electrolyte imbalance, which is an important factor contributing to mortality [20].

Another highlight of the present study was that there was no significant association between the extent of BSA involvement and mortality (p-value=0.140). This is in contrast to most foreign studies where total BSA involvement was associated with an increased frequency of mortality [8,20-22]. Vaishampayan SS et al., in an Indian study also related BSA to mortality [23]. However, studies conducted by Thakur V et al., and Kanagarajan A et al., in India demonstrated no significant association between BSA and mortality (p-value >0.05) [12,13].

The presence of erosions or crusting was not significantly associated with mortality in this study (p-value=0.745), while some foreign studies have demonstrated that the presence of erosions or crusting contributes to mortality, as these lesions are a good nidus for bacterial growth, especially MRSA [20-22]. Similar Indian studies have not factored erosions or crusting into their parameters to assess mortality [2,5,12].

The presence or absence of eye, oral, and genital lesions in the surviving group and the mortality group was not statistically significant in the present study (p-value=0.774, 0.404, 0.467, respectively). Most other studies have demonstrated similar findings [5,12,24]. However, involvement of the eyes and oral cavity contributed significantly to morbidity and prolonged hospital stays due to the lengthy healing process in these areas, and there may be severe ophthalmological sequelae post-discharge [25].

Phenytoin was the most commonly implicated drug in both the surviving group and the mortality group, and it was statistically more likely to cause mortality than other drugs (p-value=0.004). However, in several North Indian and South Indian studies, carbamazepine was the most commonly implicated drug [26-28]. In India, these two antiepileptic drugs are widely used due to their efficacy and low cost, which could explain the high frequency of SJS/TEN associated with these drugs. This is in contrast to foreign studies, where beta-lactam and sulphonamide antibiotics are the most common culprits [24,29]. In the present study, mortality was significantly higher in TEN than in SJS (p-value=0.001). This is consistent with similar Indian and foreign studies [24-28].

Conditions SJS/TEN is complicated by systemic organ involvement, such as acute renal tubular necrosis, drug-induced hepatitis, hepatic failure and respiratory tract issues like ARDS and pneumonia, all contributing to mortality. Deranged LFT, RFT, and blood haemogram are serological markers used to detect early organ involvement. However, in this study, deranged LFT, RFT and blood haemogram were not significantly associated with mortality (p-value=0.784, 0.660, 0.736, respectively). Nevertheless, Indian and foreign studies have demonstrated a relationship between deranged LFT and RFT and mortality [11,27,28]. The present study demonstrated that urine microscopy findings of albumin, RBCs and pus cells were significantly associated with mortality (p-value=0.040). This finding has not been reported in previous studies. Interestingly, out of the five cases in the mortality group that exhibited urine microscopy abnormalities, three cases had normal serum urea and creatinine levels. This indicates that urine microscopy abnormalities may be the earliest manifestation of acute renal tubular necrosis rather than serological RFT derangement. Therefore, it is warranted to perform urine microscopy in the emergency laboratory, in addition to electrolytes, RFT, and LFT, as soon as, SJS/TEN cases are admitted [29].

In the present study, data extracted from the case sheets indicated that all cases of SJS/TEN were treated uniformly with systemic steroids, antibiotics and supportive measures. Intravenous Immunoglobulin (IVIG) and ciclosporin were not used; hence, treatment outcomes regarding survival and mortality rates could not be assessed. However, systemic steroids and prophylactic antibiotics could be determining factors in the very low mortality rate observed in the present study compared to foreign studies. Future multicentric studies that factor in both SCORTEN and ABCD-10 are required to determine the mortality factors in SJS/TEN.

Limitation(s)

The present retrospective case record-based study was conducted at a single-centre. In the present study, it was not possible to correlate the SCORTEN score with the mortality rate, as it is a 10-year retrospective analysis and all SCORTEN parameters were available only in the recent case sheets, not in the older ones. Additionally, only the probable drug could be identified in cases where multiple drugs were administered.

CONCLUSION(S)

The present study showed one of the lowest mortality rates for SJS/TEN in the world. Co-morbidities such as HT were significant risk factors for mortality. Phenytoin was the most common drug associated with SJS/TEN in both the survival and mortality groups and was significantly more likely to cause mortality than other drugs. Presentation with vesicles and bullae, rather than epidermal detachment with charring, was significantly associated with mortality. Urine microscopic abnormalities were also significantly associated with mortality. Patients with TEN were more likely to die than those with SJS. The final clinical outcome of survival or mortality did not depend on whether the patient was managed in the ICU or in general wards.

REFERENCES

[1] Lakshmi R, Anoop T, Rajiv S, Ajayakumar S, Sparshadeep EM, Divakaran B. A study of adverse cutaneous drug reactions in a tertiary care centre in South India. Clin Dermatol Rev. 2021;5(2):173-77.
[2] Sasidharanpillai S, Riyaz N, Khader A, Rajan U, Binitha MP, Sureshan DN. Severe cutaneous adverse drug reactions: A clinicoepidemiological study. Indian J Dermatol. 2015;60(1):102-08.
[3] Bastuji-Garin S, Rzany B, Stern RS, Shear NH, Naldi L, Roujeau JC. Clinical classification of toxic epidermal necrolysis, Stevens-Johnson syndrome and erythema multiforme. Arch Dermatol. 1993;129(1):92-96.
[4] Wasuwanich P, So JM, Chakrala TS, Chen J, Motaparthi K. Epidemiology of Stevens-Johnson syndrome and Toxic epidermal necrolysis in the United States and factors predictive of outcome. JAAD Int. 2023;13:17-25.
[5] Patel TK, Barvaliya MJ, Sharma D, Tripathi C. A systematic review of the drug-induced Stevens-Johnson syndrome and toxic epidermal necrolysis in Indian population. Indian J Dermatol Venereol Leprol. 2013;79:389-98.
[6] Nair PS, Moorthy PK, Yogirajan Y. A study of mortality in dermatology. Indian J Dermatol Venereol Leprol. 2005;71(1):23-25.
[7] Acar A, Yoldas AH, Turk BG, Karaaslan I, Sagduyu IE, Ceylan C, et al. Stevens-Johnson syndrome and toxic epidermal necrolysis: 11-year demographic clinical and prognostic characteristics. Indian J Dermatol. 2022;67(1):12-18.
[8] Noe MH, Rosenbach M, Hubbard RA, Mostaghimi A, Cardones AR, Chen JK, et al. Development and validation of a risk prediction model for in-hospital mortality among patients with Stevens-Johnson syndrome/toxic epidermal necrolysis-ABCD-10. JAMA Dermatology. 2019;155(4):448-54.
[9] Frey N, Jossi J, Bodmer M, Bircher A, Jick SS, Meier CR, et al. The epidemiology of Stevens-Johnson syndrome and toxic epidermal necrolysis in the UK. J Invest Dermatol. 2017;137(6):1240-47.
[10] Hsu DY, Brieva J, Silverberg NB, Silverberg JI. Morbidity and mortality of Stevens-Johnson syndrome and toxic epidermal necrolysis in United States adults. J Invest Dermatol. 2016;136(7):1387-97.
[11] Yamane Y, Aihara M, Ikezawa Z. Analysis of Stevens-Johnson syndrome and toxic epidermal necrolysis in Japan from 2000 to 2006. Allergol Int. 2007;56(4):419-25.
[12] Thakur V, Vinay K, Kumar S, Choudhary R, Kumar A, Parsad D, et al. Factors predicting the outcome of Stevens–Johnson syndrome and toxic epidermal necrolysis: A 5-year retrospective study. Indian Dermatol Online J. 2021;12(2):258-65.
[13] Kanagarajan A, Murthy AB, Moni PK, Palanivel N. Clinicoetiological study of Stevens-Johnson syndrome and toxic epidermal necrolysis spectrum and the correlation of SCORTEN with prognosis. Indian J Dermatol. 2023;68(1):25-33.
[14] Micheletti RG, Chiesa-Fuxench Z, Noe MH, Stephen S, Aleshin M, Agarwal A, et al. Stevens-Johnson syndrome/toxic epidermal necrolysis: A multicentre retrospective study of 377 adult patients from the United States. J Invest Dermatol. 2018;138(11):2315-21.
[15] Sekula P, Dunant A, Mockenhaupt M, Naldi L, Bavinck JN, Halevy S, et al. Comprehensive survival analysis of a cohort of patients with Stevens-Johnson syndrome and toxic epidermal necrolysis. J Invest Dermatol. 2013;133(5):1197-204.
[16] Carrasquillo OY, Santiago-Vazquez M, Cardona R, Cruz-Manzano M, Figueroa LD. Stevens-Johnson syndrome and toxic epidermal necrolysis: A retrospective descriptive study. Int J Dermatol. 2019;58(11):1293-99.
[17] Chan L, Cook DK. A 10-year retrospective cohort study of the management of toxic epidermal necrolysis and Stevens-Johnson syndrome in a New South Wales state referral hospital from 2006 to 2016. Int J Dermatol. 2019;58(10):1141-47.
[18] Nizamoglu M, Ward JA, Frew Q, Gerrish H, Martin N, Shaw A, et al. Improving mortality outcomes of Stevens-Johnson syndrome/toxic epidermal necrolysis: A regional burns centre experience. Burns. 2018;44(3):603-11.
[19] Zhang AJ, Nygaard RM, Endorf FW, Hylwa SA. Stevens-Johnson syndrome and toxic epidermal necrolysis: Retrospective review of 10-year experience. Int J Dermatol. 2019;58(9):1069-77.
[20] Gupta LK, Martin AM, Agarwal N, D'Souza P, Das S, Kumar R, et al. Guidelines for the management of Stevens-Johnson syndrome/toxic epidermal necrolysis: An Indian perspective. Indian J Dermatol Venereol Leprol. 2016;82:603-25.

[21] Schwartz RA, McDonough PH, Lee BW. Toxic epidermal necrolysis: Part II. Prognosis, sequelae, diagnosis, differential diagnosis, prevention, and treatment. J Am Acad Dermatol. 2013;69(2):187.e1-187.e16.
[22] Suwarsa O, Yuwita W, Dharmadji HP, Sutedja E. Stevens–Johnson syndrome and toxic epidermal necrolysis in Dr Hasan Sadikin General Hospital Bandung, Indonesia from 2009-2013. Asia Pac Allergy. 2016;6(1):43-47.
[23] Vaishampayan SS, Das AL, Verma R. SCORTEN: Does it need modification? Indian J Dermatol Venereol Leprol. 2008;74:35-37.
[24] Tan SK, Tay YK. Profile and pattern of Stevens-Johnson syndrome and toxic epidermal necrolysis in a general hospital in Singapore: Treatment outcomes. Acta Derm Venereol. 2012;92(1):62-66.
[25] Sanmarkan AD, Sori T, Thappa DM, Jaisankar TJ. Retrospective analysis of Stevens-Johnson syndrome and toxic epidermal necrolysis over a period of 10 years. Indian J Dermatol. 2011;56(1):25-29.
[26] Devi K, George S, Criton S, Suja V, Sridevi PK. Carbamazepine-The commonest cause of toxic epidermal necrolysis and Stevens-Johnson syndrome: A study of 7 years. Indian J Dermatol Venereol Leprol. 2005;71:325-28.
[27] Barvaliya M, Sanmukhani J, Patel T, Paliwal N, Shah H, Tripathi C. Drug-induced Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), and SJS-TEN overlap: A multicentric retrospective study. J Postgrad Med. 2011;57(2):115-19.
[28] Sushma M, Noel MV, Ritika MC, James J, Guido S. Cutaneous adverse drug reactions: A 9-year study from a South Indian Hospital. Pharmacoepidemiol Drug Saf. 2005;14(8):567-70.
[29] Bettuzzi T, Penso L, de Prost N, Hemery F, Hua C, Colin A, et al. Trends in mortality rates for Stevens-Johnson syndrome and toxic epidermal nercolysis: Experience of a single center in France between 1997 and 2017. Br J Dermatol. 2020;182(1):247-58.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Dermatology and Venereology, Government Medical College, Thiruvananthapuram, Kerala, India.
2. Professor and Head, Department of Dermatology and Venereology, Government TD Medical College, Allapuzha, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Deepthy V Gopinath,
Gokulam, House No-28, NCC Nagar, Peroorkada,
Thiruvananthapuram-695005, Kerala, India.
E-mail: drdeepthyvgopinath@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Nov 07, 2024
- Manual Googling: Jan 10, 2025
- iThenticate Software: Jan 12, 2025 (9%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 06, 2024**
Date of Peer Review: **Dec 07, 2024**
Date of Acceptance: **Jan 14, 2025**
Date of Publishing: **Mar 01, 2025**