Clinicoepidemiological Study Of Acute Skin Failure: A Prospective Study From Tertiary Care Center Of Gujarat.

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Abstract: Background: The concept of skin failure is not well known and the need for intensive care in dermatology is overlooked. Skin failure has been defined as loss of normal temperature control with inability to maintain the core body temperature, and failure to prevent percutaneous loss of fluid, electrolytes and protein, with resulting imbalance, and failure of the mechanical barrier to prevent penetration of foreign materials. However, acute skin failure is no less serious than visceral dysfunctions like cardiac, pulmonary, renal or hepatic failure. Aims: The aim of this study is to study the clinicoepidemiological profile of the acute skin failure. Methods: This is a prospective study which was conducted over period from September 2014 to December 2016.In this study we included conditions in which acute skin failure is a consequence of various primary dermatological disorders like erythroderma,severe drug reaction,Immunobullous conditions,infections and acute generalised pustular psoriasis. After ethical institutional approval, detailed history of all the patients was taken and recorded with all demographic details and clinical examinations. Results: Out of 59 patients, 34 were male and 25 were female. Maximum 17(28.81%) patients were in the age group of 31-40 years. Among 9 conditions included in this study, 16 (27.11%) cases were of erythroderma, 12(20.33%) were of pemphigus vulgaris,11(18.64%) were of SJS .At the time of first presentation 52.60% patients were having mucosal involvement, 49.35% patients were having various systemic involvement. 46(77.9%)patients were having body surface involvement >70%. Conclusion: Effective management is more accurate only when the underlying etiology of each event of acute skin failure is clear. [Mody K Natl J Integr Res Med, 2020; 11(1):16-21]

Key Words: Acute skin failure,erythroderma

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Introduction: Skin failure has been defined as loss of normal temperature control with inability to maintain the core body temperature, and failure to prevent percutaneous loss of fluid, electrolytes and protein, with resulting imbalance, and failure of the mechanical barrier to prevent penetration of foreign materials.[1]

Though Ryan had included a wide range of conditions reflecting physical and psychological disabilities in dermatology under skin failure, here the discussion has been restricted to conditions that give rise to extensive structural disruption and total functional impairment of the skin.[2]

Etiopathogenesis of acute skin failure involves failure of skin to perform its multiple functions can lead to acute failure of heart, lung, kidney and death consequent to structural and functional alterations in various components of the skin.[3,4,5]Destruction of stratum corneum, the layer mainly responsible for the barrier function of the skin causes loss of proteins, Na, Cl and K in the bullous fluid leads to decrease in intravascular volume. The resultant decrease in urinary output and increased blood nitrogen can lead to renal failure unless treated energetically.[6]

Damaged skin with altered immunological function and its exudates support growth of a wide spectrum of endogenous and exogenous organisms leading to systemic infection, severe sepsis and death.[7,8] Impaired thermoregulation can cause either hyper or hypothermia depending on the surrounding environment.

Loss of proteins in the exudates leads to hypoalbuminaemia. Inhibition of insulin secretion and insulin resistance lead to hyperglycemia and glycosuria, which cause amino acid breakdown leading to further worsening of hyper catabolic state and condition of the patient. Increased cutaneous blood flow nearby doubles the cardiac output and may prove fatal, particularly in the elderly and in those with previous cardiac disease.[10]

Aspiration pneumonitis is common in severely ill patients. Pulmonary involvement may be a systemic manifestation and a dreaded complication of TEN. Severe pulmonary edema (secondary to capillary leak syndrome) and adult respiratory distress syndrome (ARDS) are complications of erythroderma.[11,12] Acute skin failure constitutes a dermatological emergency that requires a multi-disciplinary, intensive care

approach. Adequate knowledge about monitoring these patients and hospitalization in specialized units can reduce the high morbidity and mortality associated with this condition.

Methods And Materials:This is a prospective study which is to be conducted over period from September 2014 to December 2016 in the Department of Dermatology, venerology and leprology at a tertiary care center associated with teaching hospital at Gujarat. Ethical committee approval was taken to use the data of institute.

Causes Of Acute Skin Failure Included In This Study: Erythroderma, Drug reactions: Stevens Johnson 'S Syndrome, Toxic Epidermal Necrolysis,Acute Generalised Exenthematous Pustulosis, Acute Generalized Pustular Psoriasis, Immuno Bullous Disease: Pemphigus Vulgaris, Pemphigus Foliaceous, Infections: Staphylococcal Scalded Skin Syndrome, Febrile Viral Exanthema.

Inclusion Criteria: All patients of all age groups attending emergency department OR outdoor patient department of Dermatology of our Hospital, having skin lesion/mucosal lesion with/ without systemic complains, requiring urgent interventions, investigation or hospitalization, were included.

Exclusion Criteria: Patients having factitious complains or patients visiting emergency department with casual skin lesions /mucosal lesion with / without systemic complains which did not require urgent investigation or interventions from skin department were excluded from the study. Patient not willing for informed written consent were excluded from study.

Informed written consent was taken from all patients or patients' relatives before including them into the study group. Necessary photographs were taken as and when required. A detailed history of all the patients was taken and recorded with all demographic details. Clinical examination of all the patients was done with particular emphasis on type and extent of skin and mucous membrane lesions. All the required interventions and investigations were done as and when required for systemic involvement.

Results: In our study we had included 59 patients of acute skin failure during the period from September 2014 to December 2016 in the Department of Dermatology, venerology and leprology in a teaching hospital. Out of 59 patients, 34 were male and 25 were female. Maximum 17(28.81%) patients were in the age group of 31-40 years followed by 15(25.42%) patients in 41-50 years of age.Among 9 conditions included in this study, 16 (27.11%) cases were of erythroderma, 12(20.33%) were of pemphigus vulgaris,11(18.64%) were of SJS.

Acute erythroderma is condition which is commonly seen as Dermatological emergency. In the present study it accounted for 16 (27.11%) of total cases. Out of total 16 cases 6 (37.50%) cases were of Psoriatic origins, followed by spongiotic dermatitis 4(25%). These patients had history of skin lesions specific for the disease, but because of lack of treatment or inappropriate treatment it rapidly converts to erythroderma. Other common causes were Drug reaction 3(18.75%) culminating into erythroderma, and rest was pemphigus Foliaceous, idiopathic.

Similarly Pemphigus vulgaris is also endemic in Gujarat, justifying more number of cases of Pemphigus 12(20.33%) in the present study Patients with Pemphigus Vulgaris with septicemia are mostly from the Lower socioeconomic class, illiterate and from the rural areas. Most patient present late (1-2 months) after the onset of disease, and do not take any treatment during this period, predisposing themselves towards septicemia.

In the present study frequency of drug reaction leading to acute skin failure cases was 38.98% Common drug reactions were Stevens Johnson syndrome(47.82%) Toxic epidermal necrolysis (13.04%), extensive maculopapular rash (13.04%), Acute erythroderma (13.04%).Other drug reactions are DRESS(8.70%) and AGEP(4.34%).An attempt was made to point out the common drugs causing life threatening acute skin failure.[Table -3].In case of Stevens Johnson syndrome-Toxic epidermal necrolysis 43.75% cases were due to antiepileptic (carbamazepine) others were NSAIDS, sulfonamides, antiretroviral and penicillin group.

In present study we found high frequency of Stevens Johnson syndrome and toxic epidermal necrolysis (23.72%) SCORTEN in case of patients with Stevens Johnson syndrome and Toxic epidermal necrolysis was noted in the first 24 Hours of Hospital admission.

In present study three case of mortality was reported of one of toxic epidermal necrolysis one of erythroderma and one of DRESS. But this study was conducted at tertiary care center where intensive management could be possible otherwise it would have been more in absence of ICU.

At the time of first presentation 52.60% patients were having mucosal involvement, 49.35% patients were having various systemic involvement. 46(77.9%)patients were having body surface involvement >70%. [Chart -2]

Chart 1: Sex Distribution

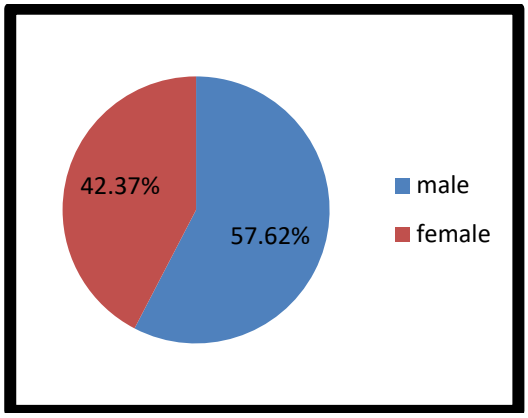

Table 1: Age Distribution

Age Group	Patients	Percentage
1 -10 Years	4	6.77%
11-20 Years	2	3.39%
21-30 Years	13	22.03%
31-40 Years	17	28.81%
41-50 Years	15	25.42%
51-60 Years	6	10.17%
>60 Years	2	3.39%
Total	59	100%

Table 2: Conditions Included In This Study Leading To Acute Skin Failure

Diagnosis	No.Of Cases	Percentage
Acute Erythroderma	16	27.11%
Acute Generalised Exanthematous Pustulosis(Agep)	1	1.69%
Acute Generalized Pustular Psoriasis	2	3.39%
Drug Reaction With Eosinophilia And Systemic Symptoms(Dress)	2	3.39%
Extensive Maculopapular Rash	10	16.94%
Pemphigus Vulgaris With Septicemia	12	20.33%
Staphylococcal Scalded Skin Syndrome	2	3.39%
Stevens Johnson Syndrome	11	18.64%
Toxic Epidermal Necrolysis	3	5.08%
Total	59	100%

Chart -2 At The Time Of Presentation Different Systemic Involvement,Mucosal Involvement And Body Surface Area Involvement >70%.

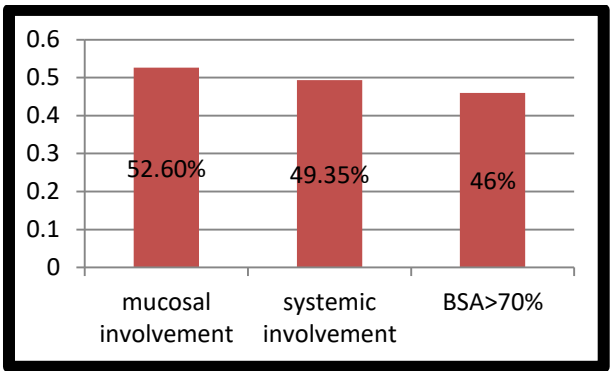

Table 3: Burden Of Drug Reaction Presenting As Acute Skin Failure

	NO.OF PATIENTS	PERCENTAGE
Drug Reaction	23	38.98%
Other Disease	36	61.01%
Total	59	100

Discussion: The concept of skin failure is not well known and the need for intensive care in dermatology is overlooked. However, acute skin failure is no less serious than visceral dysfunctions like cardiac, pulmonary, renal or hepatic failure.

Sequele of the acute skin failure is elaborated here to draw attention that acute skin failure is a major life threatening condition and urgent hospitalization and intensive management is required. The usual total water loss through the skin is 400 ml/day13 (600-1000 ml/day in temperate climates). In patients with acute skin failure, the daily percutaneous water loss far exceeds this. This is due to impaired barrier function of the skin resulting in increased transepidermal water loss (TEWL), and enhanced percutaneous fluid loss by transpiration (proportionate to the raised BMR).TEWL is highest at the peak of loss of skin through scaling. The average daily fluid loss in adult TEN patients

with approximately 50% body surface area (BSA) involvement is 3-4 liters.14 If fluid replacement is not adequate, there is reduction in the intravascular volume and formation of hyperosmolar urine.

The manifestations are dehydration and decreased urinary output. This is associated with electrolyte imbalance (low Na+ and high K+), and raised serum levels of urea and creatinine (prerenal uremia). Patients with toxic epidermal necrolysis and autoimmune bullous disorders have, in addition, extra loss of Na+, K+ and Cl- in the blister fluid. Hypophosphatemia is a common complication in these patients, aggravating insulin resistance, and altering the neurological status and diaphragmatic function. Patients with acute generalized pustular psoriasis may develop acute hypocalcemia secondary to severe hypoalbuminemia.

The principal nutrients lost in acute skin failure are protein and iron. The normal material exfoliated from the skin amounts to 500-1000 mg/day.7 It is increased several folds (9 g/m2 body surface area/day) in different disease states precipitating acute skin failure. Diffuse scaling leads to protein loss of approximately 20-30 g/m2 BSA/day.10 This amount varies with the underlying diseases, the maximum being in psoriasis followed by drug reactions and eczema.10 In presence of exudative skin lesions, the combined protein loss through oozing from the skin surface and urine (urinary nitrogen derived from hypercatabolism) may amount to 150-200g/day.8 In cases with preexisting, long-standing erythroderma, protein deficiency is evident as prominent muscle wasting.

The rise in BMR seen among patients with acute skin failure occurs at the cost of catabolism of tissue protein. To maintain thermoregulation shivering is there due to increased interleukin-1 production, reflects need to maintain higher central core temperature.9Alteration in glucose metabolism enhances further depletion of tissue protein. The cumulative effect of these factors is a negative nitrogen balance, increased urinary nitrogen and hypoalbuminemia. In addition to the loss through the shed skin, there is impaired absorption and utilization of iron and vitamin B12. An increased cellular turnover rate gives rise to relative folate deficiency. All these factors contribute to anemia.

Damaged barrier function of the skin facilitates colonization and systemic entry of commensal, exogenous and endogenous (gut flora) microorganisms. The incidence of septic complications is increased in the presence of altered body defence mechanisms. Additionally, patients may develop deep vein thrombosis resulting from prolonged immobilization. Chronic illness, and associated anxiety and sleeplessness may give rise to stress ulcers. In the healing phase, some sequelae may involve the eyes, mucous membranes, skin, hair and nail. These long-term complications can cause great morbidity.

Assessment of the severity of the disease helps in planning the management. An approximate idea of body surface area involvement can be obtained by application of the 'rule of nines. SAPS (Simplified Acute Physiological Score) is a useful guide to the clinical and biological parameters to be monitored as well as prognostic factors. SCORTEN, a TEN-specific severity scale, is an accurate predictor of mortality.

The management of patients with acute skin failure requires well-synchronized teamwork of dermatologists, internists and well-trained, devoted nursing staff.
The environmental temperature should be maintained at 30°-32°C.
Regular cleaning and removal of crusts from the oral and nasal cavities, and care of the eyes, genitalia and perianal region has to be ensured.

In female patients with TEN, periodic examination of the vagina for erosions is mandatory, as timely use of dressings reduces the chances of vaginal synechiae formation. Since there is continuous loss of water through the body surface, patients with acute skin failure are under a continuous threat of developing hypovolemia. A urine output of 50-100 ml/hour and an osmolality lower than 1020 are indicative of adequate tissue perfusion.

Like other states of shock, intravascular fluid loss must be replaced quickly. Thereafter, the total body water and electrolytes can be restored gradually. The initial fluids of choice are colloids (human albumin or fresh frozen plasma) and normal saline (NS). The daily fluid requirement in a patient with acute skin failure has to be calculated depending on the previous day's output. Though toxic epidermal necrolysis is

often compared with burn injury, the fluid requirement is 2/3rd to 3/4th of that of patients with burns covering the same area.

The patient's diet should be high in protein, 2-3 g/kg body weight per day in adults and 3-4 g/ kg body weight per day in children. Hand washing and aseptic handling of the patient has the greatest impact in reducing the chances of infection. Barrier nursing should be practiced stringently.

An oozy, denuded skin should be managed conservatively. In patients with TEN, the detachable epidermis is preferably left in place. Topical agents (0.5% silver nitrate) can be used as paints or dressings. Non-physiologic lipids (petrolatum jelly, lanolin) in vapor-permeable dressings (gauze) can be used as barrier repair agents. Use of physiologic lipids (component mixture of cholesterol, ceramide and free fatty acids in an optimized ratio of 3:1:1), accelerates the barrier repair.

Identification of the underlying disorder that has resulted in acute skin failure is of immense importance. In cases with adverse cutaneous drug reactions, the causative drug has to be stopped immediately and chemically related drugs avoided. Specific therapies like intravenous immunoglobulin, methotrexate and systemic steroid are to be administered in cases like TEN, psoriatic erythroderma and drug hypersensitivity syndrome respectively.

Conclusion: To conclude, in my study acute erythroderma came out as a leading condition of acute skin failure followed by pemphigus.Drug reaction was an apperant cause that manifest in various types of acute skin failure.At the time of presentation most of the patients are having extensive body surface involvement with systemic involvement that needs proper attention in management otherwise leads to mortality and morbidity. Though many Indian institutes have facilities for advanced dermatological care like laser therapy, phototherapy and dermatosurgery, few have an intensive care unit for patients with acute skin failure.

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