International Surgery Journal
Naik MM et al. Int Surg J. 2017 Oct;4(10):3363-3370
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20174497

Original Research Article

The clinical study of incidence and role of co-morbid conditions in management and outcome of burns patients

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Received: 11 July 2017
Accepted: 02 September 2017

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ABSTRACT

Background: The clinical study of incidence and role of co-morbid conditions in management and outcome of burns patients. The objective of this study was to determine the role of comorbid conditions in burns patient management and to understand the outcome the morbidity and mortality in burns patients with comorbid conditions.
Methods: One hundred patients suffering burn injury with associated comorbid conditions had been selected randomly (every third burns patient with associated comorbidity). Co-morbidities associated were noted from history given by the patients. It is a prospective observational clinical study of 2 years of duration. Patients admitted in the department of burns and reconstructive surgery from the 2104 October up to twenty-four months were included in this prospective study.
Results: It is a clinical observational prospective study. Study involve 100 burns patients with comorbidities: alcoholics (53%), smokers (15%), diabetic (12%), obesity (7%), psychiatric illness (6%), epilepsy (5%), bronchial asthma (2%). It was observed that morbidity and mortality were more in alcoholic (49%) and diabetic patients (33%) when compared to other co-morbid conditions. Wound infections and delayed wound healing was found more in diabetic patients. Incidence of higher percentage of burns was found in alcoholic patients.
Conclusions: This study concluded that comorbid conditions increased the duration of hospital which also affected mortality, with longest stay of 102 days and average duration of stay of patients with co-morbid conditions was 45-65 days.

Keywords: Burns patients, Comorbid conditions, Reconstructive surgery

INTRODUCTION

Comorbid conditions play an important role in the morbidity, mortality and outcome of acute burns patients. Comorbid conditions like obesity, diabetes, asthma, epilepsy, alcohol abuse, tobacco smoking and psychiatric disorders affect the patients who attain burn injuries. Age, percentage of burns, inhalation injury is also important. Other comorbidities like thyroid disorders, malnutrition, cardiovascular, etc. were not included. Role of comorbid conditions is vital in relation to the mortality and length of hospital stay and the final outcome. Burns is the major cause of mortality and a life-long morbidity in patients suffering burns injury.[1] Cause of burns is more common under the influence of alcohol, patients suffering depression due to socio economic problems, psychiatric patients, accidental burn injury at work place: chefs, oil refineries, petroleum industry, fire workers, food industries, etc. Many of the common burns in farmers by electrical injury is when they get in contact with electrical live wire, the transformer in their agricultural fields. Treatment of burns though explained, the comorbid conditions will affect the outcome of burns patients significantly. So, comorbid condition like alcohol influence, smoking, psychiatric problems, epilepsy, asthma, obesity and diabetes play an important role in

patient mortality and morbidity. Management of patients with comorbid condition is very essential to improve the patient outcome suffering burn injury.[2] Burns, Plastic and Reconstructive Surgery Department at Osmania General Hospital has dedicated acute burns care unit, special wards separately for paediatric patients, male patients, female patients and with health care workers who look after individual wards and patients, and dedicated burns operation theatre separately.[3] For plastic and microvascular surgery there are two separate theatres other than burns theatre.

METHODS

One hundred patients suffering burn injury with associated comorbid conditions had been selected randomly (every third burns patient with associated comorbidity). Co-morbidities associated were noted from history given by the patients. It is a prospective observational clinical study of 2-years of duration.

Patients were randomly selected 100 burns cases which presented from October 2014 to October 2016 with associated co-morbidities like obesity, diabetes, asthma, epilepsy, addiction to alcohol and smoking, and psychiatric problems were studied, in Department of Plastic Surgery, Osmania General Hospital, Hyderabad, Telangana.

Exclusion criteria is that patients that were excluded in the study are paediatric age <14 years and older aged patients more than seventy years. Patient participation in the study was voluntary. Patients were explained in detail about the nature of study and consent was taken before including them as a part of this prospective observational clinical study related to the role of co-morbid conditions affecting the outcome of the patients suffering burns. Patients with burns caused not only by hot liquids, mixed degree flame burns but also included patients who have suffered burns with electric flash/contact burns.

RESULTS

Comorbid conditions

Alcohol

Majority of burns patients were known to be addicted to intake of alcohol. Few were occasional alcoholic but most were addicted to alcohol intake daily according to history. Patients were found to be under the influence of alcohol at the time of burn injury. It was noted from the patient and patient attenders. These patients under influence of alcohol sustained major burns when compared to other comorbid conditions. Fifty-three patients were found to be alcoholic.

In them, thirty-seven were male and sixteen were females. Patients with the electric burns who survived the injury, in which two patients had above elbow amputation and one had below elbow amputation. Two female patients and one male patient presented with severe neck contractures after one year of discharge.

Table 1: Co-morbid conditions, types of burns.

Co-morbid conditions	Number of patients	
Alcohol	53	
Smoking	15	
Diabetes	12	
Obesity	7	
Bronchial asthma	2	
Epilepsy	5	
Psychiatric illness	6	
Total	100	
Types of burns	**Males**	**Females**
Scalds	2	4
Mixed flame burns	54	34
Electric burns	6	0
Total	62	38

Smoking

Smoking is an important comorbid condition which affects the burns patients as some burns patients, also have facial burns, and in patients with burns in closed space (bath room, small rooms) where they inhale lot of smoke causing the inhalational burns. It causes poor survival rate. Smokers usually gets into fire while lighting his/her cigarette/beedi.

Here some are only smokers and some are even alcoholic. Under the influence of the alcohol, most of patients being in disoriented state and when they try to light up the cigar and smoke, the chances of getting his/her clothes catching up fire accidently increases. Male patients were 9 and female patients were 6.

Diabetes

Diabetic patients are usually complicated patients, owing to the high prevalence of systemic microvascular damage affecting multiple organs. Also, peripheral neurological impairments are known to be predisposing factors for burn injuries, because of the decrease in protective sensation and tissue vascularity. Frequent exposure of the lower extremities to hot liquids or objects in diabetic, increases the risk of lower extremity burns in the patients. Furthermore, diabetes mellitus is well known to be associated with decreased healing ability and increased susceptibility to infection.

Diabetes in burn patients may therefore have implications for the number of surgical procedures required, the complications rate, and length of hospital stay. Blood sugar levels were checked daily by measuring the fasting and post prandial blood sugar levels and subcutaneous insulin-regular mixtard insulin were given on advice of an endocrinologist. Regular swab culture was sent from

the wound for culture and to test antibiotic sensitivity. Accordingly, antibiotic treatment was given. 7 were male patients and 5 were female patients.

Table 2: Total body surface area in male and female patients with co-morbities.

Total body surface area with alcohol history			Total body surface area with smoking history		
TBSA	**Males**	**Females**	**TBSA**	**Males**	**Females**
<10%	1	0	<10%	2	3
11-30%	4	2	11-30%	1	0
31-50%	9	7	31-50%	3	1
51-70%	15	4	51-70%	1	2
>70%	8	3	>70%	2	0
Total	37	16	Total	9	6
Total body surface area with diabetic history			**Total body surface area with obesity**		
TBSA	**Males**	**Females**	**TBSA**	**Males**	**Females**
<10%	0	0	<10%	0	0
11-30%	1	1	11-30%	0	1
31-50%	3	1	31-50%	1	3
51-70%	1	2	51-70%	1	1
>70%	2	1	>70%	0	0
Total	7	5	Total	2	5
Total Body surface area with psychiatric problems			**Total body surface area with epilepsy**		
TBSA	**Males**	**Females**	**TBSA**	**Males**	**Females**
<10%	0	0	<10%	0	0
11-30%	1	1	11-30%	1	1
31-50%	0	0	31-50%	1	1
51-70%	1	2	51-70%	1	0
>70%	0	1	>70%	0	0
Total	2	4	Total	3	2
Total body surface area with asthma			---		
TBSA	**Males**	**Females**	--	--	--
<10%	0	--	--	--	--
11-30%	0	--	--	--	--
31-50%	1	--	--	--	--
51-70%	1	--	--	--	--
>70%	0	--	--	--	--
Total	2	--	--	--	--

Obesity

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health. People are generally considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, is over 30 kg/m^2, with the range 25-30 kg/m^2 defined as overweight.

Obese patients had more complications when they suffer burns injury as, they were less frequently ambulated. A few patients died because of the complications related to deep venous thrombosis and most of them with bed sores. Obese patients also had suffered burns of higher total body surface area. Most of them were female patients due to sedentary life style and were aged between 40 years to 60 years. 2 were male patients and 5 were female patients.

Psychiatric problems

The relationship between mental disorder and burns is complex. Mental disorders may predispose to burns and burns can facilitate the development of mental disorders. Most of the patients suffer burns by burning themselves due to mental instability. Several factors like low socio-economic status, marital issues, lack of family support leading to mental depression and leading to psychiatric illness.

Most of the patients had history of using anti psychiatric medications and was discontinued by the patients which lead to burns. Some patients took local treatments for

their psychiatric problems. 2 of them are male patients and 4 of them are female patients.

Table 3: Number of male and female patients with co-morbidities according to age.

Alcohol addiction according to age			Smoking history according to age		
Age group in years	**Males**	**Females**	**Age group in years**	**Males**	**Females**
10-20	2	0	10-20	0	0
21-30	12	4	21-30	2	2
31-40	13	5	31-40	2	1
41-50	5	4	41-50	3	2
51-60	4	2	51-60	1	1
>60	1	1	>60	1	0
Diabetes according to age			**Obesity according to age**		
Age group in years	**Males**	**Females**	**Age group in years**	**Males**	**Females**
10-20	0	0	10-20	0	0
21-30	1	0	21-30	0	0
31-40	2	1	31-40	0	1
41-50	2	2	41-50	1	2
51-60	1	2	51-60	1	2
>60	1	0	>60	0	0
Psychiatric problems according to age			**Epilepsy according to age**		
Age group in years	**Males**	**Females**	**Age group in years**	**Males**	**Females**
10-20	0	0	10-20	0	0
21-30	0	0	21-30	0	0
31-40	1	1	31-40	1	1
41-50	0	1	41-50	1	1
51-60	1	2	51-60	1	0
>60	0	0	>60	0	0
Asthma according to age			---		
Age group in years	**Males**	**Females**	--	--	--
10-20	0	--	--	--	--
21-30	1	--	--	--	--
31-40	0	--	--	--	--
41-50	1	--	--	--	--
51-60	0	--	--	--	--
>60	0	--	--	--	--
			--	--	--

Table 4: Types of burns among males and females with co-morbidities.

Types of burns in alcohol addiction			Types of burns in smoking addiction		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Mixed flame burns	33	16	Mixed flame burns	9	6
Electric burns	4	0	Electric burns	0	0
Types of burns in diabetes			**Types of burns in obesity**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Scalds	0	1	Scalds	0	1
Mixed flame burns	6	4	Mixed flame burns	2	4
Electric burns	1	0	Electric burns	0	0
Types of burns in Psychiatric Problems			**Types of burns in Epilepsy**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Scalds	1	1		1	1
Mixed flame burns	1	3	Mixed flame burns	2	1
Electric burns	0	0	Electric burns	0	0.
Types of burns in asthma			---		

Types of burns	Males	Females	--	--	--
Mixed flame burns	2	0	--	--	--
Electric burns	0	0	--	--	--

Table 5: Number of patients who died during treatment who had co-morbidities.

Number of patients died during treatment who had alcohol addiction			Number of patients died during treatment who had smoking addiction		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Mixed flame burns	19	6	Mixed flame burns	2	1
Electric burns	1	0	Electric burns	0	0
Number of patients died during treatment who had diabetes			**Number of patients died during treatment who had obesity**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Mixed flame burns	2	1	Mixed flame burns	1	2
Electric burns	1	0	Electric burns	0	0
Number of patients died during treatment who had psychiatric problems			**Number of patients died during treatment who had epilepsy**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Mixed flame burns	1	1	Mixed flame burns	1	0
Electric burns	0	0	Electric burns	0	0

Table 6: Number of patients who survived during treatment who had co-morbidities.

Number of patients survived during treatment who had alcohol addiction			Number of patients survived during treatment who had smoking addiction		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Mixed flame burns	18	10	Mixed flame burns	7	5
Electric burns	3	0	Electric burns	0	0
Number of patients survived during treatment who had diabetes			**Number of patients survived during treatment who had obesity**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Scalds	0	1	Scalds	0	1
Mixed flame burns	4	3	Mixed flame burns	1	2
Electric burns	0	0	Electric burns	0	0
Number of patients survived during treatment who had Psychiatric Problems			**Number of patients survived during treatment who had epilepsy**		
Types of burns	**Males**	**Females**	**Types of burns**	**Males**	**Females**
Scalds	1	1	Scalds	1	1
Mixed flame burns	0	2	Mixed flame burns	1	1
Electric burns	0	0	Electric burns	0	0

Epilepsy

Epilepsy is a risk factor in burns patients. Epilepsy was found to be the cause of burns for some patients.

Most of them suffered burns due to hot liquids, some of them fell over gas stove during cooking. Some patients had history of fall in the camp fire lit by them for heat during winter nights.

They all suffered burns as a result of epilepsy attack while doing their day to day activity. 3 were male patients and 2 were female patients.

Asthma

2 were males and no female patients. There were no deaths among asthmatic patients suffering burns. They sustained burn injuries accidentally.

Patients with asthma and burns survived throughout the course of treatment.

DISCUSSION

Burns patients having associated co-morbidities have longer hospital stay and poor prognosis. Study involved

one hundred burns patients with associated co-morbid conditions. Co-morbid conditions taken into consideration were alcoholics, smokers, diabetics, obese, epileptic, bronchial asthma and patients with known psychiatric illness.

Many studies have reported the role of co-morbid conditions in management of burns. According to study done by Jones JD et al, 108 consecutive adult patients with flame burns were studied and found that about 27% were intoxicated at the time of injury and 90% were chronic alcoholic.[4] Also stated that, overall mortality was 3-fold greater in alcoholic and died with smaller burns. According to study by Purdue GF et al, 108 patients with weight greater than 100 kg were studied.[5] Mortality increased by 21% and respiratory and cardiovascular problems increased by 33% when compared to normal.

Study done by Rae L et al, differences in resuscitation in morbidly obese burn patients may contribute to high mortality.[6] 296 adult patients with mean TBSA of 41% were taken up for study stated that being morbidly obese was an independent risk factor for death. Obese patients suffered persistent metabolic acidosis during resuscitation with high risk of multiple organ failure.

According to study by Patricia E et al, stated that 50% of patients had detectable blood alcohol levels at time of admission.[7] Observed that T-cell and cytotoxin impairment due to alcohol and burn injury supress cell mediated immunity causing increased susceptibility for infections.

Study by Ansari Z et al, epilepsy was three times more likely to be associated with burns, with women being five times more likely to be burned.[8] Hot drinks, food, fats, cooking oils, steam and household appliances, hot tap water, hot fluids other than water, and hot heating appliances were all significant causes.

According to Josty IC et al, is a retrospective study of 111 patients suggesting burns secondary to epilepsy.[9] Most burns were small and scalds being majority. Patients and health professionals need to be aware of such injuries and of appropriate prevention strategies.

Based on study done by Arif M et al, study in 100 patients with 68% were females and rest 32% were males.[10] Observed that there were 45% cases were under matriculation, 20% had passed matriculation and remaining 10% were Intermediate and above and 25% were illiterate. 58% were unemployed in study group mainly comprising of housewives and students. 70% of patients belonged to rural areas and 30%fell under urban category. Most of the burn injury being superficial involvement of head, neck and face. Anxiety was a major co-morbid factor noticed. Medical staff should avoid treating premorbid psychopathology during the period of hospitalisation with burns and should be tackled later on, after physical recovery. Davis CS et al, observed that prevalence of binge drinking in burns with inhalation injury was high.[11]

Haum A, in a retrospective study in 225 patients found about 70% had blood alcohol levels at time of admission and had history of chronic alcohol abuse.[12]

Palmu R et al, found that mental disorders and personality disorders were common among acute burns patients before they injured themselves.[13]

Dalal PK et al, have studied that greater levels of acute pain are associated with negative long term psychological effects like acute stress disorder, depression, suicidal ideation and post-traumatic stress disorder for as long as two years after initial burn injury.[14]

Patterson et al, suggest that pre-injury mental health problems were ranging from 28% to 75%. All patients with peri injury mood and anxiety disorder were reported to have lower adjustment at the time of discharge on the general, social, psychological subscales of the burn specific health scale.[15]

Akhtar MS, did a retrospective study of 108 patients with different comorbid conditions like cardiovascular, renal, pulmonary and neurological conditions, alcohol abuse, smoking, etc. and found that length of the hospital stay increased proportionally with associated comorbidities.[16]

Thombs BD, et al stated that patients with immunodeficiency syndromes like HIV/HBsAg, and with metastatic carcinomatous conditions, liver and renal diseases show poor prognosis.[17]

Lundgren et al, study states age independent medical comorbid condition, total burns surface area significantly impact the length of the hospital stay and higher comorbidities were associated with higher mortality one year after the discharge.[18] Akhtar MS, have studied retrospectively 54 patients with burns due to epilepsy which contributed to 1.3% of the total burns admissions and burns were predominantly more in females than in males. They also stated that patients with epilepsy should be categorized into high risk group.

Maghsoudi H et al, have studied 3062 burns patients out of which 94 were diabetic and were compared with 2968 non-diabetic burns patients. It was found that diabetic patients have higher propensity for infection and should be educated about that potential problems arising due to burn injuries. Impact of diabetes on burn injury: preliminary results from prospective study.

Schwartz SB, et al, studied 40 patients in which 24 patients were diabetic and 16 were non-diabetic. They found that time for wound closure prolonged in diabetic patients despite grafting. Memmel H have done 46 months retrospective study of 1063 adult burns patients of which 68 were diabetic.[19] They were compared with

995 adult non diabetic patients and was found that peripheral neuropathy may have precipitated and delayed medical treatment in lower extremity burns and also there was increased risk for nosocomial infection with prolonged hospitalisation.

Madianos MG et al, a prospective study of 45 patients with burn injuries admitted to a major burn unit in the greater Athens area.[20]

Posttraumatic stress disorder was diagnosed in 17.8 and 20.0% of burn survivors at the baseline and the 12-month follow-up assessments, respectively. Logistic regression analysis revealed that face disfigurement was the only burn characteristic significantly associated with the presence of psychiatric morbidity.

Davydow DS et al, reviewed the literature on the prevalence of psychiatric conditions, with particular emphasis on posttraumatic stress disorder (PTSD) and depression, as well as functional impairments, in adult and pediatric survivors of burns, trauma and intensive care unit stays for other critical illnesses. found that PTSD and depressive symptoms are quite prevalent in these patient groups.

Bukovcan P et al, included 7 women with an average age of 45 years were enrolled in this retrospective study. Mean BSAB was 2.4% (range 0.5-6). All burns occurred in a domestic setting during household activities (cooking, ironing). Thermal injury included contact burn (6 patients with deep burns), followed by scald (one patient with superficial burns). 6 of 7 patients (85%) required excision of deep burns and skin grafting procedure.

Knowlin L et al, determined the effect of comorbidities on burn injury mortality as determined by the LA 50 (lethal TBSA burn at which 50% of the cohort will succumb from the burn injury) in a retrospective analysis of patients admitted to a regional burn center from 2002 to 2012. Preexisting comorbidities have a significant effect on burn injury mortality in all age groups, particularly the younger burn population. Schneider JC et al, did retrospective cross-sectional study setting inpatient rehabilitation hospitals. Patients total of 4572 patients with a primary diagnosis of burn injury from the uniform data system for medical rehabilitation database from 2002 to 2010.[21] There was no difference between the Standard model and the models that include the comorbidity and complication variables as measured by the c-statistic confidence intervals. Comorbidities and complications did not significantly affect burn inpatient rehabilitation facilities (IRF) outcomes.

CONCLUSION

This study concluded that comorbid conditions increased the duration of hospital which also affected mortality, with longest stay of 102 days in diabetic and shortest being 12 days. average duration of stay of patients with co-morbid conditions was 45-65 days This study did not take into consideration other co-morbidities like neuro vascular, metastatic cancer, liver disease, etc. and age less than 14 years and more than 70 years were not involved in the study. Hence the results may not reflect the same as in other studies.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Naik MM, Nagaprasad N, Vishwanath V. The clinical study of incidence and role of co-morbid conditions in management and outcome of burns patients. Int Surg J 2017;4:3363-70.