INTERNATIONAL JOURNAL OF PHARMACOLOGY AND THERAPEUTICS
ISSN 2249 – 6467

RESEARCH ARTICLE

DRUG UTILIZATION IN BURN PATIENTS ADMITTED IN WARDS OF A RURAL TERTIARY CARE TEACHING HOSPITAL

Padwal SL*, Motghare VM, Kulkarni MD, Jadhav RR, Deshmukh VS

Dr. Padwal SL*_,Associate Professor,Dept. of Pharmacology,SRTR Govt. Medical College, Ambajogai Dist-Beed.
Dr. Motghare VM,Professor & Head,Dept. of Pharmacology,SRTR Govt. Medical College, Ambajogai Dist-Beed.
Dr. Kulkarni MD,Associate Professor,Dept. of Pharmacology,Government Medical College, Aurangabad.
Dr. Jadhav RR,Assistant Professor,Dept. of Pharmacology,SRTR Govt. Medical College, Ambajogai Dist-Beed.
Dr. Deshmukh VS,Assistant Professor,Dept. of Pharmacology,SRTR Govt. Medical College, Ambajogai Dist-Beed.

ABSTRACT

Burn injury is significant but preventable cause of morbidity and mortality. Last few years has witnessed the change in the management of burn injury owing to the better understanding of pathophysiology of burn. Few studies have been carried out to evaluate the drug utilization pattern.To evaluate drug utilization in burn patients admitted in wards of a rural tertiary care teaching hospital.This was a cross sectional study. The patients diagnosed with burn injury and admitted during July-December 2012 were included in this study. The demographic details, details of burn injury & treatment received were noted using specially designed proforma. WHO core drug prescribing indicators were used to study the drug use. Total 100 patients were selected and included in the study. The female: male ratio was 1.2:1. The most common age group was 30-40 years. Average number of drugs prescribed was 5.17. Out of the 100, patients 29 patients expired. The percentage of drugs prescribed by generic names was 10.38% and essential drug list were 86.65%. Among analgesic drugs prescribed Diclofenac sodium was most commonly used followed by tramadol, pentazocine. All prescription contains one or analgesic or antimicrobial agents. 25% of the patients did not receive tetanus toxoid immunization. The most commonly prescribed antibiotic was Cefotaxim (42%) followed by metronidazole & gentamicin. The present study highlights the problem of over-prescription of antimicrobials, trend towards polypharmacy. The prescription from essential drug list is high. The use of generic is low. The Systemic antimicrobial treatment must be thoughtfully considered in the care of the burn patient to prevent the emergence of resistant organisms.

Keywords: Antimicrobials, Burn, Drug Utilization, Rational.

INTRODUCTION

Burn is a tissue injury from thermal (heat or cold) application or from absorption of physical energy or chemical contact [(1)]. Burn is considered one of the most complex injuries that a human being suffers [(2)]. Burn injury is significant but preventable cause of morbidity and mortality. It causes grave impact on physical, psychological and financial status of not only victim but also entire family.

According to WHO, estimated 195,000 deaths every year are caused by burns vast

ISSN 2249 – 6467

majority occurs in low-middle income countries. Almost half of these cases occur in South East Asia Region. Women in South East Asia Region has highest rate of burns accounting for 27% of global burn deaths. In India alone as estimated, over 3000,000 peoples suffers from moderate to severe burn injury every year [(3)]. Fire related burn alone is responsible for nearly 10 million DALYs (Disability Adjusted Life Year's) lost each year globally. Developed countries experiencing a decrease in mortality and morbidity but in developing countries burn related injuries remains major cause of mortality and morbidity [(4)]. Burn causes great impact on financial resources of countries like India causing excessive burden on already exhausted resources.

Drug utilization studies are integral part of medical audit and they often undertaken to monitor and evaluate prescribing practices as well as suggest modification if necessary. The assessment of drug utilization is important evaluate weather drugs are rationally prescribed.

A drug utilization study is an approved, systematic process that captures, reviews, analyses, and interprets aggregate medication use data within specific health care environments [(5)]. These studies are helpful to identify the prescribing trends and may lead to interventions to enhance prescribing behavior.

Last few years has witnessed the change in the management of burn injury owing to the better understanding of pathophysiology of burn. Few studies have been carried out to evaluate the drug utilization pattern. Therefore this study has been undertaken to determine the pattern of drugs utilization and cost of drugs in the management of patients with acute burns in a tertiary hospital in a rural tertiary care teaching hospital.

MATERIALS AND METHODS:

This was a cross sectional study carried out in SRTR GMC, Ambajogai which is rural tertiary care teaching hospital in Maharashtra from the period of July 2012-December 2012. The study was carried out after approval of Institutional Ethics Committee of our institute. The patients diagnosed with burn injury and admitted during this period were included in this study. The case sheets and drug charts of these patients were obtained from Wards & Medical Record Section and were examined to determine demographic details and treatment received.

The demographic details include age, sex, occupation etc. Other parameters such as percentage burnt surface area and depth, length of hospital stay were also noted. The treatment received was classified into pharmacological classes such as antibiotics, analgesics, sedatives, tetanus prophylaxis, antacids and anti-ulcer regimen. The cost of the drugs was calculated in accordance with the hospital pharmacy acquisition cost. The estimation of extent of burn was calculated by Rule of Nine as described by Wallace.

WHO Core Drug Prescribing Indicators:

Drug use is complex process involving patients, prescribers, dispensers. WHO has developed core drug indicators as objective method to measure drug use in health facilities that will describe drug use patterns and prescribing behaviour. These indicators provide insight into potential problems into drug use and subsequent measure to correct the problems [(6)].

In this study the following WHO core drug prescribing indicators were determined.

1. Average number of drugs per encounter
2. Percentage of drugs prescribed by generic names

3. Percentage of encounters with antibiotics prescribed
4. Percentage of encounters with injections prescribed
5. Percentage of drugs prescribed from essential drug list or formulary.
National essential drug published by Govt of India in the year 2011 was used to classify drug as essential.

RESULTS:

Total 100 patients that were admitted during a period of six months from July-Dec were randomly selected and included in this study. The most common victims were found to be in the age group of 30-40 years. Of the 100 patients 55 were females and 45 were males with female to male ratio of 1.2:1. The mean age of presentation was 28 years with range of 1 month 75 years. 23 patients were less than 12 years of age and only 6 were 60 years and above. **Table 1.**

The average burnt surface area per patient was found to be 24% with range from 2-97%. Total nineteen (19), twenty eight (28), twenty three (23), eighteen (18), twelve (12) patients had burns involving 0-20, 21-40, 41-60, 61-80, and 81-100 percent burn surface area respectively. **Table 2.** The average length of hospital stay was found to 14.5 days with an average of 1-60 days. Of the 100 patients 55 patients were discharged, 29 patients died, 20 patients left against medical advice while 3 patients were referred to higher centre for more specialised care. 14 of the 29 (48.27%) deaths occurred within 1 day of admission. Most of the deaths occurred in patients with more % burn surface area. Most of the patients presents within 24 hours of incidence. **Table 3.**

Of the 100 cases 78 cases were diagnosed as burn, 10 cases were diagnosed as electric burn and remaining (12) were diagnosed as scalds. The drug use indicators were as shown in the **Table 4**.

Total 517 drugs were prescribed to the patients. The average no. of drug prescribed were 5.17 with a range of 2-9 drugs. Nearly 10.38% of the drugs were prescribed by generic names. Of the 517 drugs, 443 drugs were prescribed from essential drug list which constitute about 85.68% of total drugs.

As shown in the **Table 5**, antimicrobials (46.43%) are the most common class of drugs prescribed followed by analgesics (19.73%) and gastroprotective agents (antacids, antiulcers) (15.28%).

All the prescriptions (100%) were found to contain one or more antimicrobial agents. The most commonly prescribed group of antibiotic was found to cephalosporins (20.69% of total drug use) especially 3rd generation cephalosporins were frequently prescribed. The most commonly prescribed antimicrobial was ceftazidime (13.15%) followed by gentamicin (10.45%) and metronidazole (08.51%). The average number of antimicrobial prescribed was found to be 2.4 with range of 1-4 antimicrobial. The average duration of anti-microbial therapy was 10.5 days with broad average of 1-45 days. In most of the cases antibiotics were started empirically. Most of the antibiotics were prescribed by parenteral route of administration.
The frequency of individual antibiotic prescribed was as shown in **Table 6.**
As shown in the **Fig 1**. The number of patients receiving antimicrobial treatment for 1 day, >1day but less than 7 days, >7 days but less than 15 days and ≥ 15 days were 8, 24, 48, and 20 respectively. Most of the patients received antimicrobials prophylactically (64%). **Fig. 2.**

ISSN 2249 – 6467

Table 1: Demographic Profile of The patients.

Age Group	Males	Females	Total
0-10	12	10	22
>10-20	04	07	11
>20-30	06	07	13
>30-40	10	18	28
>40-50	09	06	15
>50-60	02	03	05
>60-70	01	02	03
>70	01	02	03
Total	**45**	**55**	**100**

Table 2: Percentage of burn and mortality

Percentage TBSA Burned	No. of patients (percentage)	No. of deceased patients (percentage)
1-20	19	00
21-40	28	01
41-60	23	01
61-80	18	16
81-100	12	11
Total	100	29

Table3: Time interval between burn & admission of patients

Post Burn Hours on admission	Number of Patients
0-4	28
4-8	32
8-16	12
16-24	08
24-32	07
32-40	07
>40	06

ISSN 2249 – 6467

Table 4: Prescribing Indicators

Prescribing Indicator	Data (No.)
1. Average drug prescribed	5.17
2. Not Mentioned a) Superscription b) Age c) Diagnosis d) History of Immunization	 10 13 06 30
3. Drugs prescribed by Generic Names (%)	10.38
4. Drugs prescribed from Essential drug list (%)	85.68
5. No. of prescription containing a) NSAIDs b) Antimicrobials Average duration Of antimicrobial therapy c) Injections d) Antiulcer e) IV fluids	 100 100 7 days 92 79 100

Table 5: Category of Drugs prescribed

Category	No.	Percentage
Antimicrobials	240	46.43
NSAIDs	102	19.73
Opioids	22	04.25
Gastroprotective Agents	79	15.28
Corticosteroids	23	04.44
Others	51	9.87
Total	**517**	**100**

ISSN 2249 – 6467

Table 6: Most commonly prescribed antimicrobials

Antimicrobial prescribed	No. of Prescriptions	Percentage
Ceftazidime	68	13.15%
Cefotaxim	18	03.49%
Ceftriaxone	21	04.06%
Gentamicin	54	10.45%
Metronidazole	44	08.51%
Amoxycillin	09	01.74%
Ofloxacin	12	02.32%
Vancomycin	02	0.39%
Amoxicillin + Clavalunic Acid	12	02.32%

Fig 1: No of days of antimicrobial therapy

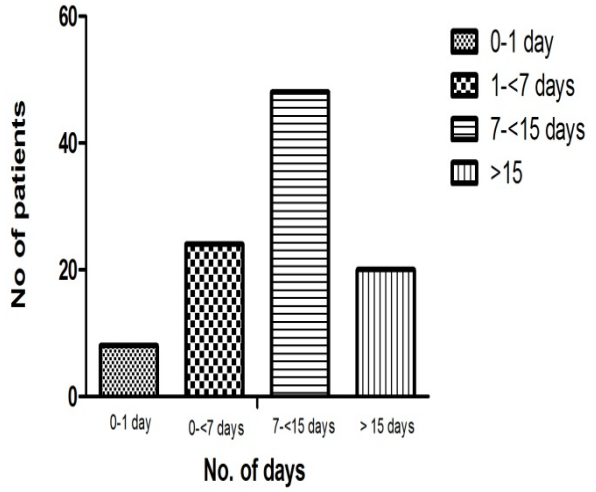
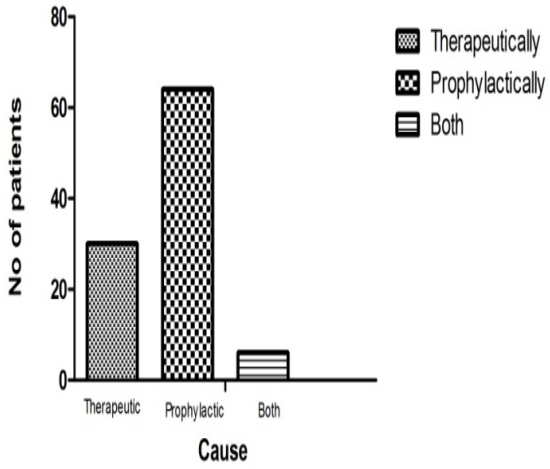


Fig 2: Cause of Antimicrobial Prescription



ISSN 2249 – 6467

DISCUSSION:

Burn injury is one of the most devastating conditions encountered in medicine practice. It is one of the significant but preventable causes of mortality and morbidity. Statistics had proven that developing countries suffer most severely and has huge load of burn injuries. Most of the patients in our country are still managed at peripheral centres. Despite advances in management in burn patients, morbidity and mortality remains high. This may be due to lack of specialised medical care, poor adherence to standard guidelines. Recent years have witnessed the change in the management of burn patients due to better understanding of pathophysiology of burn and advances in the field of medicine. Appropriate drug utilization studies are needed for evaluating proper utilization of drugs for efficacy, safety, convenience and economic aspects. [3]

In the present study we tried to find out the pattern of drug utilization with special emphasis on antimicrobial prescription.

Out of 100 patients, it was observed that 29 patients expired, 46 patients discharged on medical advice, 3 patients were referred to higher centre and 22 patients left against medical advice. The mortality was less than that reported by Jivangi RS and Subrahmanyan M, Joshi AV [7, 9] but slightly higher than that established by Major Trauma Outcome Society (MTOS) [10]. Majority of the deceased had more than 60% burns. Most of the patients died during first 24 hours of admission. It may be due to delay in seeking treatment, accidental injuries associated. The average time taken seeking the treatment was 6.2 hours. This may due to the fact that our hospital is in rural area close to the community. The most common age group in our study was middle age group between 30-40 years.

The average number of drugs prescribed is an important parameter of prescription audit. The average number of drugs prescribed in our study was 5.17 at the time of admission. This number is higher than previously reported by Santoshkumar R. Jivangi et al [7] which is 4.5 at the time of admission. This may be due to the fact that many of the patients in our study suffer more severe degree of burns.

In our study, higher number of females suffered from burn injury. The ratio of female to male patients was 1.22:1. This observation was in accordance to NCRB report in India [8] & study carried out by Subrahmanyan M, Joshi AV. [9]

The percentage of drugs prescribed by generic names was 10.38% and this finding is in accordance with Jivangi RS et al [7] The drugs prescribed from essential drug list were high (86.65%).

Among analgesic drugs prescribed Diclofenac sodium was most commonly used followed by tramadol, pentazocine, PCM, Ibuprofen. Opioids are used more frequently in our study than reported by Jivangi RS et al [7]. All prescription contains one or more analgesic drugs. Higher number of opioids prescribed may be due to the fact that more patients suffered severe injury.

Patients with burns who have received adequate prior tetanus immunoprophylaxis should receive a tetanus toxoid if more than five years have elapsed since the last booster administration. Patients without adequate prior tetanus immunization should receive tetanus toxoid as well as 250 units of intramuscular tetanus immune globulin. While deciding about tetanus toxoid immunization, it is important to obtain the detail history about immunization. In our study, the history regarding tetanus toxoid immunization was not reported in 30% of the patients. Nearly 25% of the patients did not receive any tetanus toxoid

immunization. This practice need to be rationalized.

The most common group of drugs prescribed in our study was antimicrobials. Antibiotic utilization study performed in two medical departments showed that 35.3% and 39% patients received at least a single antimicrobial agent [11]. In our study, nearly all patients received at least one antimicrobial agent. Antimicrobials were used both prophylactically and therapeutically. The role of antimicrobials used prophylactically is controversial. The meta-analysis of prophylactic antibiotics in burn patients has concluded that prophylaxis is currently not recommended for patients with severe burns other than perioperatively [12]. Irrational use of antibiotics often leads to development of resistance and unnecessary increase in the cost of treatment.

Majority of the patients received combination therapy with two different types of antimicrobials. The combination therapy has a number of theoretical advantages such as broader spectrum of activity, prevention of emergence of resistant strains etc. Combination therapy is also recommended in case of multidrug resistant organisms [13]. With above considerations in mind some authors prefer combination therapy over single drug therapy. So these can be considered rational. Many of the patients in our study received antibiotic prophylaxis for more than 15 days of duration. According to the Guidelines from the French Society for Burn Injuries (SFETB), antibiotic therapy lasting for 7-8 days is recommended [13]. Longer duration of antibiotic therapy is often unjustified and may cause increase in selection pressure leading to development of resistant strain. There may be unnecessary increase in the cost of treatment and many a times can cause toxicity in patients.

Thus it can be concluded that, though drugs used in the burn care management in our set up is accordance with the standard treatment guidelines, some aspects of utilization need to be rationalized. so as to achieve better patient care.

CONCLUSION

Despite the advances in the management of burns, mortality and morbidity due burn injury remains high. The present study highlights the problem of over-prescription of antimicrobials, trend towards polypharmacy. The prescription from essential drug list is high. The use of generic is low. The Systemic antimicrobial treatment must be thoughtfully considered in the care of the burn patient to prevent the emergence of resistant organisms.

REFERENCES:

1) Bailey and Love's. Short practice of surgery. 24th ed. 2008, p. 279.

2) M. Masellis, "Thermal agent disaster and fire disaster: definition, damage, assessment and relief operation," in *The Management of Mass Burns Casualties and Fire Disaster: Proceedings of the 1st International Conference in Burns and Fire Disasters*, M. Masellis and S. W. A. Gunn, Eds., pp. 7– 12, Kluwer Academic Publishers, Dordrecht, The Netherlands, 1992.

3) World Health Organisation. Fact sheet May 2012 (Online) Available from http://www.who.int/mediacentre/factsheets /fs365 /en/index.html# (Assessed on 16/02/2013.)

4) Mock C, Peck M, Peden M, Krug E, eds. A WHO plan for burn prevention and care. Geneva, World Health Organization, 2008.Available from http://www.who.int/violence_injury_prevention (Accessed on 16/10/2013)

5) Ilse Truter. A Review of Drug Utilization Studies and Methodologies. Jordan Journal of Pharmaceutical Sciences 2008;1(2): 91-104.

6) International Network for Rational Use of Drugs and World Health Organization. How to investigate drug use in health facilities: Selected drug use

indicators. EDM Research Series No. 7 [WHO/DAP/93.1]. Geneva: World Health Organization, 1993.
7) Jeevangi SR, Patil RB, Awanti SM, Manjunath S, Patil B, Devi K. Drug utilization study in a burn care unit of a tertiary care hospital. Asian Pacific Journal of Tropical Disease 2011; 41-46.
8) National Crime Records Bureau. Accidental deaths and suicides in India. New Delhi Ministry of home affairs. Government of India:2005.

9) Subrahmanyan M, Joshi AV. Analysis of burn injury treated during a one year period at a district hospital in India. Annals of Burns and fire disaster 2003; 16 (2): 1-3.
10) Champion HR, Copes WS, Sacco WJ, Lawnick MM, Keast SL, Bain LW Jr, et al. The major trauma outcome study: establishing national norms for trauma care. J Trauma 1990; 30: 1356-1365.
11) Gendel J, Azzam ZS, Braun E Levyy, Krivoy N. Antibiotic utilization prevalence prospective comparison between two medical department in a tertiary care University hospital. Pharmacoepidemiol Drug Saf 2004; 13: 735-739.
12) Avni T, Levcovich A, Ad El DD, Leibovici L, Paul M. Prophylactic antibiotics for burns patients: systematic review and meta-analysis. BMJ 2010; 340: c241.
13) Ravat F, Le-Floch R, Vinsonneau C, Ainaud P, Bertin-Maghit M, Carsin H, Perro G; Société Française d'Etude et de Traitement des Brûlures (SFETB). Antibiotics and the burn patient. Burns 2011 Feb; 37(1):16-26.