

A STUDY ON ROLE OF VARIOUS TYPES OF TOPICAL OINTMENT AND ITS OUTCOME AMONG BURN PATIENTS: AN INTERESTING FOLLOW UP STUDYSunita Meshram¹, Kamlesh Dhruv², Avinash Meshram³, K. K. Singh⁴, Dhiraj Bhawnani⁵**HOW TO CITE THIS ARTICLE:**

Sunita Meshram, Kamlesh Dhruv, Avinash Meshram, K. K. Singh, Dhiraj Bhawnani. "A Study on Role of Various Types of Topical Ointment and its Outcome among Burn Patients: An Interesting follow up Study". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 64, August 10; Page: 11110-11122, DOI: 10.14260/jemds/2015/1602

ABSTRACT: Burn injury causes major bulk of the surgical emergencies. Burn infection makes the burn wound complicated causes considerable mortality and morbidity. Timely and effective use of antimicrobial and topical dressings revolutionizes burn care by decreasing invasive wound infection. The administration of broad-spectrum antibiotics on routine basis is likely to encourage. The emergence of resistant organism therefore, timely and judicious use of antibiotics is essential for better result. **MATERIAL AND METHODS:** The present study was carried out in 160 burns and scald admitted in surgical wards in Department of General Surgery, SGMH and S.S. Medical College, Rewa (M. P.) during period of one year. The cases are fully recorded and thoroughly studied with the aim of establishing the incidence, mode of burn and causes of burn, source of burn, clothing at time of incidence, time and place of incidence and detail clinical assessment. On admission resuscitation started with intravenous fluid, calculated according to the Parkland formula and prophylactic antibiotic given in all the patients after sampling for culture and sensitivity. Symptomatic and supportive treatment added as per need. **RESULTS:** Out of 160 patients, majority of the patient belong to 21 – 40 year 48.1%. Majority of patient (34.4%) had total body surface burn area burnt between 21-40% and 12.5% patient had burnt area 61-80%. Maximum (50.0%) complain of irritation was reported by the patients to whom Silver sulphadiazine was applied while least (10%) by the patients to whom nadoxine was applied. **CONCLUSION:** The incidence of invasive infection and overall mortality was significantly reduced after the introduction into clinical practice of topical burn wound anti-microbial agent, our study shows that the most effective topical antimicrobial agent in burn patient is Nadoxine.

KEYWORDS: Topical ointment, Burn, Wound dressing, Healing, India.

INTRODUCTION: With the evaluation of man he created fire, which was a source of energy for cooking the food, which also kept him warm but with this advantage the injuries caused by fire also come as an evil. The injuries caused by fire remain more or less challenge to their successful management till today. Thermal injury is one of the major causes of mortality and morbidity in surgical patients.

Over last two decades there has been significant decline in mortality and morbidity rates. This is due to continuously expanding knowledge and path-physiology of thermal injury and rapid development of better topical agents and systemic antibiotics.

Timely and effective use of antimicrobial and topical dressings revolutionizes burn care by decreasing invasive wound infection. The administration of broad-spectrum antibiotics on routine basis is likely to encourage. The emergence of resistant organism therefore, timely and judicious use of antibiotics is essential for better result. Wound healing is a complex process leading to adequate surface structural continuity and strength approximating traumatized tissue.

ORIGINAL ARTICLE

Ancient Romans treated burn with mixture of honey with oil soaked clothes. In modern era, use of synthetic and biological dressing provide stable coverage without painful dressing, barrier to prevent evaporative loss, decrease pain in wound and promotes epithelialization.^[1,2,3]

Dressing over burn wound decrease pain, decrease protein loss, reduce evaporative heat and water loss from the wound surface and also guard against secondly infection protect viable epithelial element from destruction and may even provide a scaffolding for epithelial in growth.^[4]

Burn injury causes major bulk of the surgical emergencies. Burn infection makes the burn wound complicated causes considerable mortality and morbidity. Burn infection increases the cost of therapy not only due to antibiotic therapy but also due to prolonged hospital stay and increased manpower involvement for the management of the burn cases and burn unit. The present study was undertaken to see the role of application of various topical ointments and its outcome in burn patients.

MATERIAL AND METHODS: The present study was carried out in 160 burns and scald admitted in surgical wards in Department of General Surgery, SGMH and S.S. Medical College, Rewa (M. P.) during period of one year. (May 2002 to April 2003) Ethical considerations were met through institutional ethical committee.

The cases are fully recorded and thoroughly studied with the aim of establishing the incidence, mode of burn and causes of burn, source of burn, clothing at timed incidence, time and place of incidence and detail clinical assessment. Patients who died during initial resuscitation or left against medical advice/absconded were excluded from the study.

A detailed relevant history was taken. A special attention was paid to the type of fire or heat producing burn.

In Local Examination Extent of burn, Depth of burn, Presence of Infection and Presence of Gangrene were also recorded diagrammatically.

Management: On admission resuscitation started with intravenous fluid, calculated according to the Parkland formula and prophylactic antibiotic given in all the patients after sampling for culture and sensitivity. Symptomatic and supportive treatment added as per need.

Local management of the wound was done by open or closed method in a randomly selected patients depending upon site and depth of burn. Closed dressing was preferred in extremities and in the part of lower abdomen and back. Open dressing was preferably done on the face, perineum and/or chest. Treatment was initiated in selected patient with closed dressing and subsequently managed by open technique and vice versa.

Exposure Method: Burn area is initially cleaned with detergent, antiseptic such as cetrimide, savalon using no-touch technique in a positive pressure ventilated dressing station.

A protective prophylactic barrier ointment (Silver Sulphadizine) is spread on to the sterile piece of gauze using sterile spatula and then applied to the surface of burn. A further barrier to contamination is then applied in the form of thick layer of cotton wool and finally crepe bandage and sometimes in children a thin plaster cast. The purpose of a very thick layer of wool or gauze is to act as barrier and to absorb the profuse exudate and prevent it from reaching the surface where it can be act as a culture medium for organism reaching the surface of soaked crepe bandage.

Gauze absorbs fluid to a greater extent than wool. Majority of burn patient do not require a general anaesthesia for dressing but sedation may be necessary in few cases.

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Care should be taken that May local application, which us being used, is not toxic because local application can be absorbed through the surface of burn into general circulation. So it is wise to use well-tried local antibiotics substances, which are safe and non-toxic.

Skin Grafting: Autogenous skin grafts were used in some cases of localized area for early wound coverage in very few cases. Grafting was done usually in third week under anaesthesia.

The head neck burn wound were treated by open dressing, while closed dressing was done in rest other burnt area of body. The dressing were open on 3rd or 4th day and condition of the wound was observed to find whether:

1. It was clear or infected.
2. It was healed or not.
3. Presence of healthy granulation.
4. Epithelization of the wound.

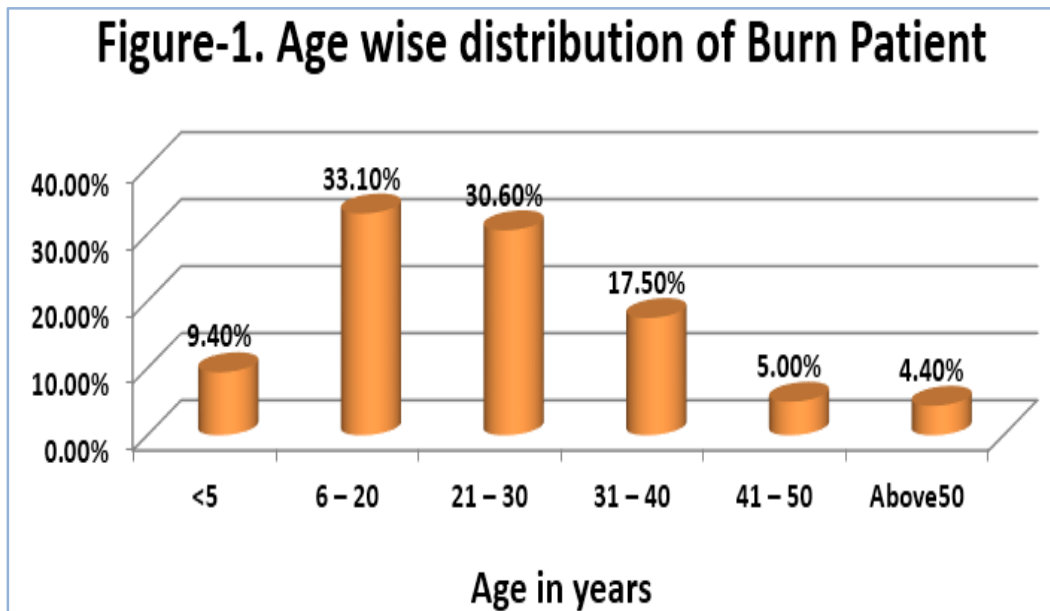
Desloughing was done in ward and in-patient with deep burn in which eschar or more sloughs were present, they were kept in OT for dressing under general anaesthesia where slough and eschar removed.

Further antibiotics therapy was changed on the basis of culture and sensitivity report and culture were sent at frequent interval to rule outgrowth of new organism. During the treatment patient were watched for development of any local complication like renal failure, pulmonary failure, and hematological disturbances etc., which were adequately treated from time to time.

Supportive therapy was modulated according to progress of the patient. Patients were encouraged for oral diet and nutritional supports and were supplemented by intravenous protein, lipids and whole blood. Patient and relative were explained about the importance of physiotherapy and were encourage for the same by all levels of workers.

RESULTS:

Age in year	Total	
	No	%
<=5	15	9.4%
6 – 20	53	33.1%
21 – 30	49	30.6%
31 – 40	28	17.5%
41 – 50	8	5.0%
Above50	7	4.4%
Total	160	100.0%
Female: Male Ratio - 1.71:1		
Table 1: Age and Sex distribution of Burn Patient		



It is evident from above table that out of 160 patients, majority of the patient belong to 21 – 40 year 48.1%. Next common group was 6 – 12 years. F: M ratio was 1.71:1. [Table-1, Figure-1]

Variables	No. of Cases	Percentage
Percentage of TBSA		
0 – 20	38	23.8%
21 – 40	55	34.4%
41 – 60	22	13.8%
61 – 80	20	12.5%
81 – 100	25	15.6%
Total	160	100.0%
Depth of Burn		
Superficial Burn	50	31.3%
Deep Burn	08	5.0%
Mixed	102	63.8%
Total	160	100.0%

Table 2: Variable associated with study subjects

Majority of patient (34.4%) had total body surface burn area burnt between 21-40% and 12.5% patient had burnt area 61-80%. The next common was 38(23.8%) patient with 0-20% total body surface burn area. The majority of patient had superficial + deep burn (63.8%), 31.3% had superficial burn whereas only 5.0% had deep burn. [Table-2]

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	No. of Cases	Percentage
Dressing		
Closed Dressing	123	76.9%
Open dressing	05	3.1%
Open + Closed	32	20.0%
Total	160	100.0%
First Treatment [Topical Ointment]		
Alloderm B	45	28.1%
Silver Sulphadizine	32	20.0%
Honey	21	13.1%
Sofratulle	18	11.3%
Batadine	12	7.5%
Nadoxin	10	6.3%
Collagen Sheath	08	5.0%
Others	14	8.8%

Table 3: Distribution of cases according to Dressing and use of topical ointment

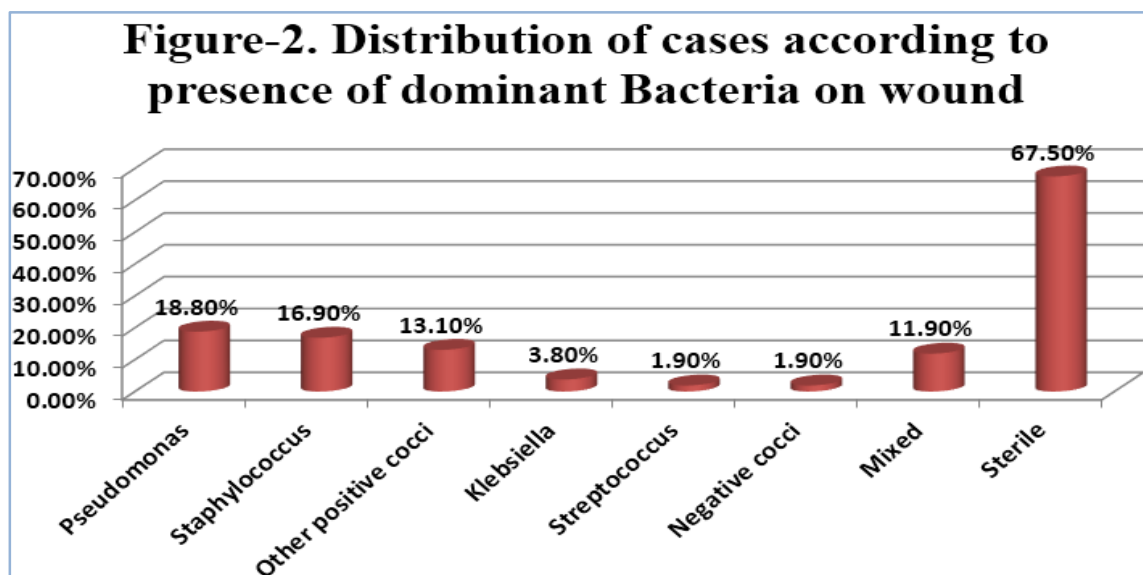
Majority of patient were treated by closed dressing (76.9%). Only 5 patients (3.1%) by open dressing and in 32 patients (20.0%) both open and closed dressing were applied.

Initially when patient was admitted in the ward silver Sulphadizine was applied in all patients and later they were treated with other topical agents.

It is evident from the above table that majority of patient (28.1%) were treated by topical ointment Alloderm B. 20.0% with Silver Sulphadizine, 13.12% by Sofratulle. [Table-3]

Name of Bacteria	No. of Cases and %		Antibiotic sensitivity
Pseudomonas	30	18.8%	O,AK, Cefo
Staphylococcus	27	16.9%	O,CP,G
Other positive cocci	21	13.1%	CP,AK,O,CTAX
Klebsiella	6	3.8%	AK,CP
Streptococcus	3	1.9%	O,CP,G
Negative cocci	3	1.9%	G,AK,CTAX
Mixed	19	11.9%	O,AK, Nor,CP
Sterile	108	67.5%	

Table 4: Distribution of cases according to presence of dominant Bacteria on wound and their sensitivity to Antibiotic



Infection on wounds was of mixed type but dominant colony of Pseudomonas was the most commonly (18.8%) found bacteria in burn patients. It was observed that infection gradually decreases with duration. The culture on admission was sterile in maximum number of patients except in those cases who admitted 2-3 days after burn whereas maximum infection was found in 1st week. Organisms were most sensitive to antibiotics namely Amikacin (AK), Gentamycin (G), ofloxacin (O), ciprofloxacin (CP), ceftriaxone (CTAX), and Norflox (NOR), Cefofarazone (cefo) [Table-4, Figure-2]

Ointments	On admission		7 th day		14 th day		21 th day		28 th day	
Alloderm B	45	28.1%	23	14.4%	12	7.55%	8	5.0%	6	3.8%
Silver sulphadizine	32	20.0%	15	9.4%	9	5.6%	5	3.1%	1	0.6%
Honey	21	13.1%	10	6.3%	2	1.3%	1	0.6%	1	0.6%
Sofratulle	18	11.3%	9	5.6%	3	1.9%	1	0.6%	1	0.6%
Betadine	12	7.5%	10	6.3%	2	1.3%	2	1.3%	0	0.0%
Nadoxin	10	6.3%	3	1.9%	0	0.0%	0	0.0%	0	0.0%
Collagen sheath	8	5.0%	6	3.8%	2	1.3%	2	1.3%	2	1.3%
Other	14	8.8%	11	6.9%	7	4.4%	2	1.3%	2	1.3%
Total	160		87		37		21		13	

Table 5: Distribution of patients according to use of various ointments in different weeks

As it is evident from the above table, on admission in majority of cases Allodrem B ointment was used (28.1%) followed by Silver Sulphadizine (20.0%). Honey was applied in 13.3% cases. Which was continued in majority of the cases on the following days? Only in selected cases collagen sheath and sofratulle was applied. [Table-5]

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Effect	7 th day			14 th day			21 th day		
	AB	SS	HY	AB	SS	HY	AB	SS	HY
Edema	04	04	00	00	00	00	01	00	00
Discharge	17	08	02	08	08	01	07	00	04
Infection	16	13	04	00	00	07	04	00	01
Slough	15	13	02	00	00	06	03	01	00

Table 6: Effect of commonly used ointments over the healing of wound

AB- Alloderm B, SS- Silver sulphadizine, HY- Honey

As it is evident from the above table that in majority of the patients at the end of the first week the edema subsides which practically disappears at the end of third week. The discharge, infection and slough gradually decrease irrespective of ointments used. Honey gives good responds in first week but on subsequent it may increase discharge. [Table-6]

Ointment	Total No.	Irritation		Rashes		Skin Staining		Cooling Effect	
		No.	%	No.	%	No.	%	No.	%
AB	45	15	33.3%	05	11.1%	01	2.2%	37	82.2%
SS	32	16	50.0%	10	3.1%	1	3.1%	27	84.4%
HY	21	07	33.3%	-		-		20	95.2%
Bet.	12	05	41.7%	01	8.3%	02	16.74%	07	58.3%
N.	10	01	10.0%	-		-		07	

Table 7: Distribution of cases according to local reaction of various ointments used

AB- Alloderm B, SS- Silver sulphadizine, Hy- Honey, Bet.- Betadine, N.- Nadoxin

As evident from the table maximum (50.0%) complain of irritation was reported by the patients to whom Silver sulphadizine was applied while least (10%) by the patients to whom nadoxin was applied. Rashes were reported maximum with Alloderm B whereas no case of rashes was reported with honey and Nadoxin. Skin staining was observed maximum (95.2%) by Honey followed by silver sulphadizine (84.4%). [Table-7]

Sl. No.	Ointment	Total	IOE		Granulation		Healing	
			NO	%	NO	%	NO	%
1	Alloderm B	45	21	46.7%	20	44.4%	17	37.8%
2	Silver sulphadizine	32	14	43.8%	14	43.8%	14	43.8%
3	Honey	21	13	61.9%	12	57.1%	06	28.6%
4	Sofratulle	18	11	61.1%	11	61.1%	09	50.0%
5	Betadine	12	08	66.7%	08	66.7%	07	58.3%
6	Nadoxin	10	08	80.0%	08	80.0%	04	40.0%
7	Callogen Sheath	08	04	50.0%	03	37.5%	02	25.0%
8	Other	14	09	64.3%	09	64.3%	06	42.9%

Table 8: Distribution of cases according to condition of wound at the time of discharge with relation to the topical ointment used

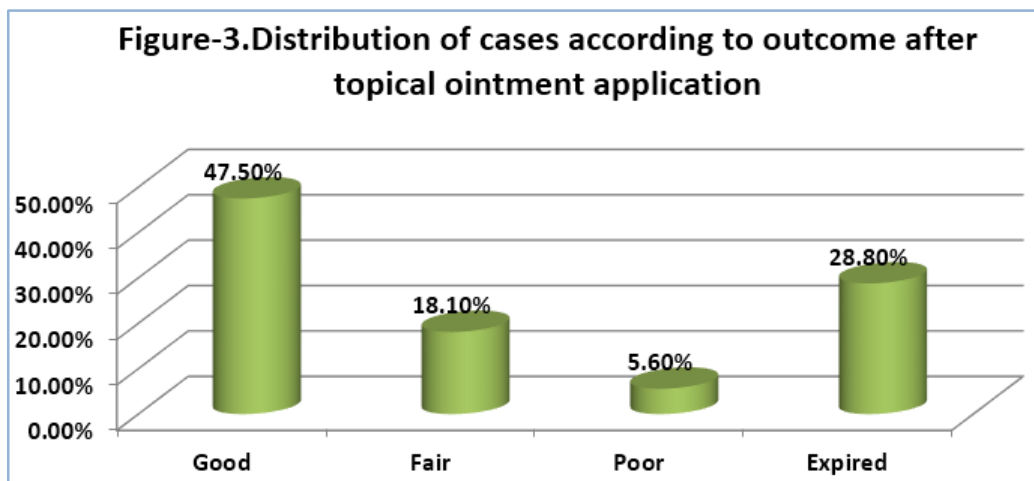
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At the time of the discharge, initialization of epithelium and granulation was observed maximum in patients where Nadoxin was applied (80.0%) followed by Betadine (66.7%) but healing was observed maximum in patients where Betadine was applied. [Table-8]

	No. of Cases	%
Outcome		
Good	76	47.5%
Fair	29	18.1%
Poor	09	5.6%
Expired	46	28.8%
Total	160	100.0 5
Late complication		
Hypergranulation	44	27.5%
Contracture	37	23.1%

Table 9: Distribution of cases according late complication and basis of outcome

*Multiple complications were reported on a percent.



It is evident from above table that majority(47.5%) patient recovered while 28.8% expired. 18.1% had fair result whereas 5.6% showed poor result.

It is evident from the above table that majority of patient died within 2 days and was high with the high percentage of burn. Early deaths were due to primary hypovolumic and neurogenic shock. Deaths in the second and third week due to toxemia while deaths after 30 days were due to anaemia and hyperproteninaemia. [Table-9, Figure-3]

DISCUSSION: Many previous studies and literatures were also supporting the present study.^[5-30] First aid received before hospitalization is an important factor from the treatment and prognosis point of view, because it directly reflects on the chances of recovery. This is important in all types of burn and particularly in deep and extensive burns. Application of cold water is the cheapest, safest and most effective method, which reduces the contact of heat and lessens the tissue damage from burn injury.

ORIGINAL ARTICLE

The percentage of body surface area burned is a very vital parameter not only in the management of burn injuries but also for assessing the prognosis of patient suffering from burn history.

In our study, majority of patients 34.4% has 21-40% of body surface area burnt and 23.8% has (0-20%) body surface area burnt i.e., to say that out of total 160 patients, about 90 patients had less than 40% body surface area burnt. 20 cases out of total 160 had 61-80% body surface area burnt and 25 cases had (8-100%) body surface area burn.

P. Kumar and Chandra A (1997) observed 62% cases had total body surface burnt more than 40%.^[16]

Subramanyam (1996) observed 10-40% total body surface area burnt in 100% patients.^[15] The depth of injury and the burn surface area are perhaps the most important parameter in the thermal injury.

The majority of patients had mixed (Superficial + Deep) burn (63.9%), 31.3% had superficial burn, while only 5.0% had deep burn alone. The depth of burn is dependent on the heat dissipating capability of the skin. A scald in an infant will be deeper than an identical scald in a young adult.

Antibiotics therapy in burn patients started with lister, whose Carbolic Acid spray was used in Scotland for many years before it was concluded that more harm than good results were seen from its use. Davidson introduced tonic acid treatment for burns in the 1930 and antiserum was suggested by many workers as a means of preventing staphylococcal and streptococcal infection.^[12,13]

There were three methods used for treating wound of burn and scalds. Closed method of dressing was used in 76.9% cases while only 3.1% were treated by open method and 20.0% burn wound were treated by both open and closed methods.

For many years, burn have been treated by daily washing, removal of loose dead tissue and topical application of saline soaked dressing until they heal themselves or granulation tissue appeared in the base of wound. The surgical principle that "Clean wound should be closed" has been applied since the days Hippocrates. Before the introduction of effective topical antimicrobial agents, up to 60% of deaths were caused by burn wound sepsis.^[5,14]

In the present study, Pseudomonas was the most common organism cultured 18.8%. Second most common cause of infection was Staphylococcus aureus (16.9%) followed by other +ve cocci (1.9%), 11.9% patients were infected by mixed organism whereas 67.5% were found sterile.^[6]

On admission the burn wound was usually sterile and cultures were positive on 7th day onwards. On admission only 6% patient were culture positive and were those who were admitted late in wards.^[8]

The organisms were mostly sensitive to antibiotics namely cefotaxime, Amikacin, Gentamycin, Ofloxacin, Ciprofloxacin.

In the present series pseudomonas stands 1st in number like R. Tessler et al, Sen Gupta et al and report from B.R.J. (1981-1982), all reported Pseudomonas as the commonest pathogen causing burn wound septicaemia.^[7,9]

Varieties of topical agents namely Alloderm-B, silver Sulphadizine, Sofratulle, Honey and Betadine were used for the management of burn wound. Alloderm-B as topical agent was used maximum (28.1%) patient while silver Sulphadizine was used in (20.0%), Honey (13.1%) and Sofratulle in 11.3% cases. Others like Betadine (7.5%), Nadoxin (6.3%), Collagen sheath (5.0%) and other combined ointments (8.8%) were also used in some cases.

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Various topical agents have been used for application over the burn wound with almost similar result in long-term use. Literature explains about primary treatment of burn wound with only steroid dressing and subsequent cleaning with Luke warm saline. Topical agents with antibiotics, antiseptics or aloe Vera and other biological promoters claim their superiority over the other.

There are various parameters claim their superiority over the others. There are various parameters which have to be considered for standard comparison like age, depth and degree of burn, area with or without systemic antibiotic therapy. Specialized nursing with all nutritional parameter can only prove the superiority of any antibiotic. Role of primary skin grafting cannot be over stressed. Collagen sheath and compression dressing have always given better result but are costly and not available for all types of patients.^[10,11]

Irritation was complained maximum (50%) in patient to whom silver Sulphadizine was applied. Rashes were reported maximum in patients to whom Alloderm B was applied. Skin staining was the major problem of Betadine while cooling effect was reported best by honey.

Before the invention of these new topical agents, large number of patients used to die as a result of sepsis. Burn wound sepsis is the primary cause of death in early post burned period and is often characterized by massive invasive infection.¹⁹ the ineffectiveness of systemic antibacterial therapy in combating such infection is due primarily to the avascular nature of the burn wound. In the absence of proper vascular channels and cellular host defense mechanism, ²⁰ the systemically administered antibiotics cannot reach the site in effective concentration. The logical approach under such condition would be the use of topical antibacterial agents.^[18]

The exposure method was used by cleaning the burn wound and placing on clean bed. The objective of this method is to control bacterial colonization by exposing the wound to sunlight. This method was mostly used in burn of face, neck, perineum and extensive area of trunk. Healing was delayed in comparison with closed method but the advantage was that there was no restriction in the movements.^[21,22]

The closed method of dressing was used in burns involving upper and lower limbs. There was less chance of infection in closed dressing so that healing was rapid in them.^{[22],[23]}

Most of the superficial and partial burn wounds took 7-21 days to heal, while full thickness wound took more than 45 days to heal and required skin grafting.

In the combined method burn area over face, neck, chest and abdomen were kept open while closed dressing was done in limbs.

In the present series, at the time of discharge and granulation was observed maximum in patient with Nadoxin (18.0%) but healing was observed maximum in patient treated with Betadine (58.3%).

In the present study of 160 cases, 76(47.5%) patient were discharged in good condition, 29(18.1%) were fair and 9(5.6%) were poor and 46(28.8%) patient expired.

Burn is a serious injury, which involves almost all the system of body directly or indirectly. It imperils life at the instant of injury and during the rapidly occurring and overlapping periods of shock, toxemia and infection. The overall mortality in burn patient for total one year period was 28.8%. The following are the reports of the various workers. Mortality percentage reported by Bjpayee (1982) is almost similar to the present series.^[24,27]

Mortality and body surface area burnt are directly related. In the present study it was observed that as the body surface area burnt increase the mortality rate also increases.

ORIGINAL ARTICLE

Some deviations are seen as few relatives took their patient without any information and so on follow-up was possible. 92% mortality was observed in cases with body surface area burnt above 80%.

Subrahmanyam M and Joshi AV also observed that body surface area burned seems to be the most significant factor, as all patients with above 60% TBSA burns died, with an overall mortality rate of 68.5%, which was much higher than in other studies. [28-30]

CONCLUSION: The incident of invasive infection and overall mortality was significantly reduced after the introduction into clinical practice of topical burn wound anti-microbial agent, our study shows that the most effective topical antimicrobial agent in burn patient is Nadoxine (Which is topical fluroquinolone).

The addition of systemic antibiotic appears to enhance bacterial control in burn wound, prevent resistance and promote wound healing and reduced mortality of burn patient. Developing country like India needs an aggressive public education program so that people become more literate about various etiological factors causing burns. The important need of the burn patient in the society is the availability of easily accessible and affordable hospitals for better care and good outcome of the patients.

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