

RESEARCH ARTICLE

Comparison of efficacy and cost-effectiveness of topical fusidic acid and topical mupirocin in the treatment of impetigo

Anusha Rani M V¹, Bhuvaneshwari E², Venkatakrisna A³

¹Department of Pharmacology, ESIC Medical College, Hyderabad, Telangana, India, ²Department of Pharmacology, Osmania Medical College, Hyderabad, Telangana, India, ³Department of Dermatology and Venereal Diseases, Osmania General Hospital, Hyderabad, Telangana, India

Correspondence to: Bhuvaneshwari E, E-mail: bhuvana2005@gmail.com

Received: September 12, 2019; Accepted: October 05, 2019

ABSTRACT

Background: Impetigo is a highly contagious skin infection of the superficial epidermis that most often affects the age group of 2–5 years children, although it can occur in any age group. Topical antibiotics as the advantage of being applied only where needed, minimizing antibiotic resistance and avoiding gastrointestinal and other systemic adverse effects. **Aims and Objectives:** This study aimed to evaluate the efficacy and cost-effectiveness of topical fusidic acid and mupirocin in the treatment of Impetigo. **Materials and Methods:** This was an open-label, prospective study conducted on 100 patients of impetigo. The present study was conducted at the Department of Pharmacology in collaboration with the Department of Dermatology of Osmania General Hospital, Hyderabad, India, from August 2016 to July 2017. Patients were randomly allocated to two groups, namely Group I receiving topical fusidic acid 2% and Group II receiving topical mupirocin 2% thrice daily for 1 week. At the end of the 1st week, a detailed clinical examination was performed. Scoring System of Impetigo (SSI), number of lesions, and size of existing lesions were measured. The clinical outcome was graded as mild-to-moderate (SSI score 1 or 2 and presence of lesions) and good (SSI score 0 and no lesions). **Results:** Statistical analysis was performed using the Student's paired *t*-test and unpaired *t*-test. $P < 0.05$ was considered statistically significant. In the fusidic acid group, the number of lesions (mean \pm SD) declined from 4.24 ± 1.17 to 0.24 ± 0.82 , wound area decreased from 3.24 ± 0.95 to 0.34 ± 1.18 , and SSI decreased from 2.32 ± 0.47 to 0.14 ± 0.49 . While in the mupirocin group, the number of lesions declined from 4.16 ± 1.11 to 0.14 ± 0.70 , wound area decreased from 3.45 ± 1.14 to 0.17 ± 0.85 , and SSI decreased from 2.44 ± 0.50 to 0.08 ± 0.39 . All these parameters were statistically significant. Adverse events in both groups were mild and did not require any specific treatments. Cost incurred to treat one case successfully was 46 Indian National Rupee (INR) for fusidic acid and 72 INR for mupirocin. **Conclusion:** In this study, at the end of the 1st week, efficacy is 92% in Group I receiving topical fusidic acid 2% and 96% in Group II receiving topical mupirocin 2%. There is no statistically significant difference between the two groups ($P > 0.05$) as calculated by the unpaired *t*-test. The cost incurred to treat one case successfully is less with fusidic acid (INR 46) as compared to mupirocin (INR 72) (cost-effectiveness). Hence, fusidic acid is more cost-effective than mupirocin.

KEY WORDS: Scoring System of Impetigo (SSI); Mupirocin; Fusidic Acid; Impetigo

Access this article online

Website: www.njppp.com

Quick Response code

DOI: 10.5455/njppp.2019.9.0933205102019



INTRODUCTION

Impetigo is a common bacterial skin infection that particularly affects children^[1] Recent estimates of the global burden of impetigo are 111 million children from developing countries^[2] and 140 million^[3,4] people affected at any one time. Impetigo usually is transmitted through direct contact.^[5] Impetigo is

National Journal of Physiology, Pharmacy and Pharmacology Online 2019. © 2019 Bhuvaneshwari E, *et al.* This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

of two types, namely non-bullous (also known as impetigo contagiosa) and bullous.^[6]

Non-bullous

The non-bullous type of impetigo accounts for more than 70% of cases of superficial pyoderms. It occurs in children of all ages as well as in adults. Non-bullous impetigo is usually caused by *Staphylococcus aureus*, but *Streptococcus pyogenes* can also be involved, especially in warmer, more humid climates.

Bullous

Bullous impetigo is caused only by *S. aureus* and is characterized by large, fragile, flaccid bullae that can rupture and ooze yellow fluid. It usually resolves within 2–3 weeks without scarring.^[7]

The highly contagious nature of impetigo also allows spread from patients to close contacts. Although impetigo is considered a self-limited infection, antibiotic treatment is often initiated for a quicker cure and to prevent the spread to others.^[8] Advice ranges from the use of oral flucloxacillin, erythromycin, penicillin, or cephalosporins to topical treatment with fusidic acid, mupirocin, neomycin, or bacitracin.^[9–12] The British National Formulary recommends topical fusidic acid or mupirocin and oral flucloxacillin or erythromycin for widespread disease. Topical antibiotics are more effective than placebo and preferable to oral antibiotics for limited impetigo.

The topical antibiotic has the advantage of being applied only where needed, thus minimizing antibiotic resistance and avoiding gastrointestinal and other systemic adverse effects. Systemic antibiotics are often reserved for more generalized or severe infections in which topical therapy is not practical. The ideal treatment should be effective, inexpensive, have limited adverse effects, and should not promote bacterial resistance.

This study compares the efficacy and cost-effectiveness of topical fusidic acid and topical mupirocin in the treatment of impetigo.

MATERIALS AND METHODS

This study was done to evaluate the efficacy and cost-effectiveness of topical fusidic acid with topical mupirocin in the treatment of impetigo.

Study Center

The present study was conducted in patients attending the Dermatology Outpatient Department (OPD) of Osmania Hospital, Hyderabad, India.

Ethical Consideration

The present study protocol was approved by the Institutional Research Committee. Informed consent was obtained from all the participants. Confidentiality of the data was ensured.

Study Period and Sample Size

This study was done on 100 patients attending Dermatology-OPD from August 2016 to July 2017.

Inclusion Criteria

The inclusion criteria were as follows:

1. Patients clinically diagnosed with impetigo (bullous and non-bullous impetigo)
2. Patients between the age group of 1 and 30 years
3. Patients of either sex
4. Patients with number of lesions up to 10 (bullous and non-bullous impetigo).

Exclusion Criteria

The exclusion criteria were as follows:

1. Patients with underlying skin disorders as pre-existing eczematous dermatitis and trauma with clinical evidence of secondary infections
2. Complicated bacterial skin infections, those requiring the systemic administration of antibiotics
3. Patients with HIV infection, diabetes mellitus, or patients on corticosteroids therapy
4. Patients with known hypersensitivity to fusidic acid and mupirocin
5. Pregnant women and lactating women
6. Patients unwilling or unable to comply with the study procedures.

Informed consent was obtained from all participating patients.

The diagnosis of impetigo was confirmed clinically. Scoring system of the lesions was done with reference erythema, edema, vesiculation, pustulation, and crusting. Scoring was applied to every parameter [Table 1].

Apart from the above, wound areas were also measured by the greatest length of the wound in two perpendicular dimensions with a standard metric ruler. The two measurements were multiplied together to obtain the overall wound size.

The endpoints were evaluated two times in the study, at the baseline, and after 1 week of treatment.

Patients were randomly allocated to two treatment groups – Group I receiving topical fusidic acid 2% thrice daily for 1 week and Group II receiving topical mupirocin 2% thrice daily for 1 week.

Efficacy Assessment

The patients of the two groups were followed up at the end of the 1st week to assess the efficacy. At the end of the 1st week, a detailed clinical examination was performed. Scoring System of Impetigo (SSI) assessed, number of lesions, and size of existing lesions were measured. The treatment was considered effective only if at the end of the 1st week, the SSI, number of lesions, and size of lesions decreased from previous visit. The patients were asked for any adverse events occurred during the course of treatment.

Cost Effectiveness Assessment

The cost-effectiveness was calculated on the basis of total expenditure on medicine in Indian National Rupee (INR) at the end of the 1st week, cure rate and two drugs were compared on the basis of the amount needed to treat one case successfully.

Statistical Analysis

The statistical analysis was carried out using the GraphPad Prism software. All the data were presented as mean±SD. The Student’s paired *t*-test and Student’s unpaired *t*-test were used to evaluate the statistical significance. *P* < 0.05 was considered statistically significant.

RESULTS

Of the 100 patients enrolled in the study, 60 were male and 40 were female. Most of the patients were 1–10 years of age. Before starting the treatment, the baseline characteristics of the two treatment groups were compared (mean ± SD) [Table 2].

In Group I, the number of lesions declined from 4.24 ± 1.17 to 0.24 ± 0.82, wound area decreased from 3.24 ± 0.95 to 0.34 ± 1.18, and SSI decreased from 2.32 ± 0.47 to 0.14 ± 0.49 [Table 3]. While in Group II, the number of lesions declined from 4.16 ± 1.11 to 0.14 ± 0.70, wound area decreased from 3.45 ± 1.14 to 0.17 ± 0.85, and SSI decreased from 2.44 ± 0.50 to 0.08 ± 0.39 [Table 4].

Intergroup comparison between these two groups after the treatment for 1 week was compared, and it is not statistically significant [Table 5]. Clinical cure in Group I was seen in

46 cases of 50, while that in Group II was seen in 48 cases of 50 [Table 6].

Cost-effectiveness of each study drug at the end of the 1st week based on overall cure rate was calculated [Table 7].

Table 2: Baseline characteristics of two treatment groups

Parameters	Group I (fusidic acid) (n=50)	Group II (mupirocin) (n=50)	P
Age in years (Mean±SD)	10.46±7.61	9.60±7.18	>0.05
Gender ratio (male/female)	29/21	31/19	
Scoring System of Impetigo	2.32±0.47	2.44±0.50	>0.05
Number of lesions (mean±SD)	4.24±1.17	4.16±1.11	>0.05
Size of lesions (cm ²) (mean±SD)	3.24±0.95	3.45±1.14	>0.05

P>0.05 is not significant

Table 3: Clinical cure for fusidic acid

Parameter	Before treatment	After treatment	P
Number of lesions (Mean±SD)	4.24±1.17	0.24±0.82	<0.0001*
Wound area (Mean±SD)	3.24±0.95	0.34±1.18	<0.0001*
Scoring System of Impetigo (Mean±SD)	2.32±0.47	0.14±0.49	<0.0001*

*Statistically significant

Table 4: Clinical cure for mupirocin

Parameter	Before treatment	After treatment	P
No. of lesions (mean±SD)	4.16±1.11	0.14±0.70	<0.0001*
Wound area (mean±SD)	3.45±1.14	0.17±0.85	<0.0001*
Scoring System of Impetigo (mean±SD)	2.44±0.50	0.08±0.39	<0.0001*

*Statistically significant

Table 5: Comparison of the clinical cure for Group I and II after 1 week of treatment

Parameter	Group I (fusidic acid)	Group II (mupirocin)	P
No. of lesions (Mean±SD)	0.24±0.82	0.14±0.70	>0.05
Wound area (cm ²) (Mean±SD)	0.34±1.18	0.17±0.85	>0.05
Scoring System of Impetigo (Mean±SD)	0.14±0.49	0.08±0.39	>0.05

P>0.05 is not significant

Table 1: Scoring system of impetigo

Score	Comments
0	No parameter noticed
1	Parameter noticed by the patient and the physician, not disturbing the patient
2	Parameter definitely present and interfering with some activity and sleep
3	Parameter marked and disturbing and interfering with some activity and sleep

Table 6: Clinical outcome in two treatment groups at the end of the 1st week

No. of Patients	Group I	Group II	P
Cured (SSI 0+absence of lesions)	46	48	>0.05
Not cured (SSI 1 or 2+presence of lesions)	4	2	
Efficacy	92%	96%	

$P > 0.05$ is not significant. SSI: Scoring System of Impetigo

Table 7: Cost-effectiveness of each study drug at the end of the 1st week based on the overall cure rate

Parameters	Fusidic acid	Mupirocin
Cost in INR for 100 participants	42×100=4200	69×100=6900
Overall cure rate (%)	92	96
Cost-effectiveness	4200 for 92 participants	6900 for 96 participants
Cost in INR to treat one case	46	72

INR: Indian National Rupee

The cost incurred to treat one case successfully is less with fusidic acid as compared to mupirocin. Hence, fusidic acid is more cost-effective than that of mupirocin.

DISCUSSION

In this study, the patients were randomly allocated into two groups. Group I included 50 patients who received topical fusidic acid 2% thrice daily for 1 week. Group II included 50 patients who received topical mupirocin 2% thrice daily for 1 week.

In Group I treated with topical fusidic acid 2%, the clinical cure parameters were assessed before and after treatment for 1 week. The number of lesions decreased significantly with $P < 0.05$. The wound area lesions decreased significantly with $P < 0.05$. The SSI score decreased significantly with $P < 0.05$. While in Group II also, the number of lesions decreased significantly with $P < 0.05$ after 1 week of treatment. The wound area decreased significantly with $P < 0.05$ after 1 week of treatment. The SSI also decreased significantly with $P < 0.05$ after 1 week of treatment.

Clinical efficacy was defined as the absence of lesions and SSI score zero after 1 week of treatment with no appearance of any new lesions from the initial visit. The percentage of patients cured to the total number of patients in the study group was taken as clinical efficacy. The efficacy of Group I was 92% while that of Group II was 96%. Clinical outcome after 1 week in both groups was not statistically significant.

Adverse effects reported in this study were mild and did not require any specific treatment or discontinuation of drug.

Cost-effectiveness of each study drug at the end of the 1st week based on the overall cure rate was calculated in INR. The cost incurred to treat one case successfully was INR 46 for fusidic acid and INR 72 for mupirocin. Hence, fusidic acid was more cost-effective than that of mupirocin in the treatment of impetigo.

The results of our study with regard to clinical effectiveness are consistent with a study done by Koning *et al.* and they found no difference between the effectiveness of mupirocin and fusidic acid.^[7] Chosidow *et al.* compared retapamulin with fusidic acid and found that adverse effects were virtually non-existent with fusidic acid. In our study, only few cases in the fusidic acid group complained of mild adverse effects. We could not find any study that compared cost-effectiveness of mupirocin and fusidic acid.

In our study, proper randomization was done to allocate a patient to the treatment group. Care was taken to maintain similar demographics in both groups. Fifty cases were assigned to each group keeping in view the accepted sample size. Cost-effectiveness was also compared in this study, which was not done in any previous studies.

Limitations

However, our study was limited to mild-to-moderate cases of impetigo having ≤ 10 lesions. Impetigo with secondary bacterial infections was excluded here, and the outcome may vary in such cases. Further studies are required in various subsets of impetigo cases.

Impetigo is a common and highly contagious superficial bacterial skin infection. Schools are advised to exclude affected children until lesions have healed/crusted over or until they have received at least 2 days of treatment. It can be sporadic, although outbreaks can arise in the conditions of overcrowding and poor hygiene or institutions. A widespread form can occur in neonates. Predisposing factors are minor skin abrasions and the existence of other skin conditions, such as infestations or eczema.^[13]

One-third of skin and soft-tissue infections in returning travelers are attributable to impetigo, usually secondary to infected mosquito bites.^[14]

Treatment options for impetigo include topical antibiotics, systemic antibiotics, and topical disinfectants. The topical antibiotics recommended for impetigo are fusidic acid 2%, mupirocin 2%, and retapamulin 1%. In this, we compared the efficacy and cost-effectiveness of topical fusidic acid and topical mupirocin.

CONCLUSION

Clinical efficacy of fusidic acid was 92% and mupirocin was 96%. There is no statistically significant difference between

the two treatment groups. All the adverse events observed in both the groups were mild and did not require any specific treatment. The cost incurred to treat one case successfully with fusidic acid was INR 46 and that for mupirocin was INR 72. Hence, fusidic acid is more cost-effective than that of mupirocin in the treatment of impetigo.

ACKNOWLEDGMENT

We are thankful to the Department of Dermatology, Osmania General Hospital and Osmania Medical College, Telangana, India.

REFERENCES

- George A, Rubin G. A systematic review and meta-analysis of treatments for impetigo. *Br J Gen Pract* 2003;53:480-7.
- Carapetis JR, Steer AC, Mulholland EK, Weber M. The global burden of group a streptococcal diseases. *Lancet Infect Dis* 2005;5:685-94.
- Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, *et al.* Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: A systematic analysis for the global burden of disease study 2010. *Lancet* 2012;380:2163-96.
- Hay RJ, Johns NE, Williams HC, Bolliger IW, Dellavalle RP, Margolis DJ, *et al.* The global burden of skin disease in 2010: An analysis of the prevalence and impact of skin conditions. *J Invest Dermatol* 2014;134:1527-34.
- Cole C, Gazewood J. Diagnosis and treatment of impetigo. *Am Fam Physician* 2007;75:859-64.
- Hartman-Adams H, Banvard C, Juckett G. Impetigo: Diagnosis and treatment. *Am Fam Physician* 2014;90:229-35.
- Koning S, van der Sande R, Verhagen AP, van Suijlekom-Smit LW, Morris AD, Butler CC, *et al.* Interventions for impetigo. *Cochrane Database Syst Rev* 2012;1:CD003261.
- Feaster T, Singer JI. Topical therapies for impetigo. *Pediatr Emerg Care* 2010;26:222-7.
- Collier JA, Longmore JM, Hodgetts TJ, editors. *Skin diseases*. In: *Oxford Handbook of Clinical Specialties*. 4th ed. Oxford: OUP; 1997. p. 575-603.
- Hunter JA, Savin JA, Dahl MV, editors. *Infections*. In: *Clinical Dermatology*. 2nd ed. Oxford: Blackwell Science; 1995. p. 161-93.
- Hay RJ, Adriaans BM. Bacterial infections. In: Chapman RH, Burton JL, Burns DA, Breathnach SM, editors. *Rook/Wilkinson/Ebling Textbook of Dermatology*. 6th ed. Oxford: Blackwell Sciences; 1998. p. 1097-179.
- British Medical Association and Royal Pharmaceutical Society of Great Britain. *Anti-bacterial Drugs (5.1)*. In: *British National Formulary*. London: BMJ Books; 2001. p. 252-90.
- Ralston S, Penman I, Strachan M, Hobson R. *Davidson's Principles and Practice of Medicine*. 22nd ed. Netherlands: Elsevier; 2018. p. 1275.
- Hochedez P, Canestri A, Lecso M, Valin N, Bricaire F, Caumes E, *et al.* Skin and soft tissue infections in returning travelers. *Am J Trop Med Hyg* 2009;80:431-4.

How to cite this article: Anusha Rani MV, Bhuvaneshwari E, Venkatakrishna A. Comparison of efficacy and cost-effectiveness of topical fusidic acid and topical mupirocin in the treatment of impetigo. *Natl J Physiol Pharm Pharmacol* 2019;9(12):1225-1229.

Source of Support: Nil, **Conflict of Interest:** None declared.