Scientific Foundation SPIROSKI, Skopje, Republic of North Macedonia
Open Access Macedonian Journal of Medical Sciences. 2025 Sep 15; 13(3):175-178.
https://doi.org/10.3889/oamjms.2025.12034
eISSN: 1857-9655
Category: *B – Clinical Sciences*
Section: *Dermatology*

Use of Compression Therapy as Preventive Strategy for Recurrent Cellulitis on the Lower Legs

Vesna Brishkoska-Boshkovski[1,2], Mirela Vasileva[2,3], Andrej Petrov[1,2]

[1]Department of Dermatology, Acibadem Sistina Clinical Hospital, Skopje, RN Macedonia; [2]Department of Dermatology, Faculty of Medical Sciences, University Goce Delchev, Shtip, RN Macedonia; [3]Department of Dermatology, Clinical Hospital Shtip, RN Macedonia

Citation: Brishkoska-Boshkovski V, Vasileva M, Petrov A. Use of Compression Therapy as Preventive Strategy for Recurrent Cellulitis on the Lower Legs. Open Access Maced J Med Sci. 2025 Sep 15; 13(3):175-178. https://doi.org/10.3889/oamjms.2025.11968
Keywords: antibiotic prophylaxis; chronic leg oedema; compression therapy; lymphoedema; recurrent cellulitis.
***Correspondence:** Vesna Brishkoska-Boshkovski. Department of Dermatology, Acibadem Sistina Clinical Hospital, Skopje, RN Macedonia. E-mail: vbrishkoska@yahoo.com
Received: 29-Jan-2025
Revised: 11-Mar-2025
Accepted: 24-Aug-2025

Funding: This research did not receive any financial support
Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: Recurrent cellulitis of the lower limbs is a significant clinical challenge, with chronic oedema and impaired lymphatic function identified as key risk factors. While long-term antibiotic prophylaxis is commonly recommended, compression therapy has been proposed as a potential preventive measure, but evidence supporting its effectiveness remains limited.

AIM: This study aimed to evaluate whether compression therapy, in addition to standard antibiotic and supportive treatment, reduces the recurrence rate of cellulitis in patients with a history of recurrent cellulitis on the lower legs.

METHODS: A randomized controlled study was conducted over two years in a dermatology department. Seventy-three patients with a history of recurrent cellulitis were randomized into two groups: one receiving compression therapy along with standard antibiotic and supportive treatment (n=36) and a control group receiving only standard treatment (n=37). Patients were followed for two years to assess recurrence rates. Secondary outcomes included hospital length of stay and reduction in leg oedema. Data distribution was tested with the Shapiro-Wilk's W test. Qualitative data of patients with and without relapse were compared with non-parametric tests, quantitative data were compared with Student's t-test.

RESULTS: The recurrence rate was significantly lower in the compression therapy group (13.89%) compared to the control group (37.84%) (p=0.0197). Patients receiving compression therapy also had a significantly greater reduction in leg oedema by day four of hospitalization (p=0.005) and a shorter length of hospital stay (p=0.0006).

CONCLUSION: In this randomized controlled study, using the compressive therapy resulted in lower rate of cellulitis recurrence compared to the standard treatment of cellulitis. These findings support the inclusion of compression therapy in the management strategies for recurrent cellulitis. Further studies are warranted to reinforce these results and optimize treatment protocols.

Introduction

Cellulitis is defined as a common bacterial infection of the deep dermis and subcutaneous tissue that carries significant morbidity and costs [1]. Its recurrence is a common complication of cellulitis. The recurrence rate is 8% to 20% per year [2], but in a three-year follow-up study the reported recurrence rate is significantly higher, more than 45% [3]. Systemic antibiotics are treatment of choice for patients with cellulitis and its recurrent episodes, described in several protocols [4]. These protocols suggest long-term antibiotic prophylaxis as a method for the prevention of recurrent episodes of cellulitis [4], [5]. But the protocols also proclaim treatment of the modifying predisposing risk factor for recurrence [4], [5].

Several studies have determined risk factors for recurrence [6], [7], [8]. Lymphoedema and chronic edema interchangeably are evaluated as one of the most significant risk factors for developing cellulitis on the lower extremities and for its recurrence [6], [9], [10]. Chronic edema predisposes individuals to cellulitis and its recurrent episodes and impairs lymphatic drainage. The obstruction of lymphatic drainage increases the level of interstitial protein that yields better living environment for the bacteria which encloses the vicious cycle [9]. Thus, chronic oedema is not only a result of cellulitis but also increases the risk of recurrence and morbidity.

Compression therapy is considered standard of care for treating venous ulcers and other oedema-causing problems of the lower limbs [11]. It has been hypothesized that use of compressive garments improves the drainage of the lymphatic system and thus reduces oedema which can reduce the risk of reinfection. The role of compressive therapy in the treatment of cellulitis is still debatable. Many physicians in their practice use compressive therapy in the treatment of this disease and also several guidelines suggests its using to prevent recurrent cellulitis but there is limited evidence to support these practices [9], [12].

This study aimed to evaluate whether compression therapy, in addition to standard antibiotic and supportive treatment, reduces the recurrence of cellulitis in patients with a history of recurrent lower limb cellulitis.

The primary objective of this study was to evaluate if cellulitis patients receiving the compressive treatment will have a lower recurrence rate. Secondary outcomes were to evaluate cellulitis-related length of hospital stay and resolution of the leg oedema.

Methods

We conducted a two – year randomized controlled study, conducted in a dermatology department. Hospitalized patients aged ≥ 18 years, with a diagnosis of acute cellulitis on the lower limbs and had a history of recurrent cellulitis in the last two years on the same anatomical localization were recruited. All types of necrotizing skin and soft tissue infections (SSTI) and skin infection in severely immunocompromised patients, have been excluded. The patient was randomly assigned into two groups, using computer-generated randomization. Group 1 received compression therapy in addition to standard antibiotic and supportive treatment, while Group 2 received only antibiotic and supportive therapy. Both groups were followed in a course of two years to monitor for recurrence. The diagnosis of cellulitis was made by the investigator, solely on the clinical findings, and a medical records of having recurrent cellulitis in the last two years on the same anatomical localization.

The compression therapy was initiated upon hospital admission and included application of compression bandages for the first two - three days to reduce the limb oedema, followed by knee-high compression (class 1 or 2). A peripheral vascular examination with Doppler ultrasound was performed on all patients to exclude contraindication for using the compressive garments.

Baseline variables included demographic characteristics, hospital stay duration, and leg edema measurement using the circumferential method which involves wrapping a soft tape measure around the swollen extremity to measure the biggest circumference. Measurement of the leg edema was taken on the first and fourth day of hospitalization.

The statistical analysis of the data obtained from the research was done in the Statistical Package for the Social Sciences program (SPSS Inc, Chicago, Illinois) version 23.0. Data distribution was tested with the Shapiro-Wilk's W test.

Categorical (attributive) variables are shown with absolute and relative numbers, numerical (quantitative) with average, standard deviation, minimum and maximum values, median and interquartile ranks.

Qualitative data between patients with and without relapses were compared with non-parametric tests (Pearson Chi square test, Fischer exact test), quantitative data were compared with Student t-test. Statistical significance was defined at the $p<0.05$ level.

Results

The study included 73 patients with acute cellulitis of the lower limbs, of which 41 (56.16%) were women and 32 (43.84%) were men. The patients age ranged from 35 to 87 years, with a mean± SD age of 60.7 ± 12.7 years. Group 1 consisted of 36 (49, 32%) patients who, amongst the antibiotic and supportive therapy received compressive treatment. Group 2 consisted of 37 (50, 68%) patients who received only antibiotic and supportive therapy (Table 1).

Table 1: Baseline Characteristics of the Participants

Baseline characteristics of the participants		n (%)
Gender	Women	41 (56.16)
	Men	32 (43.84)
Age	Mean ± SD	60.7 ± 12.7
	Min - Max	35 – 87
	Median (IQR)	61 (54 – 69)
Compressive treatment	Group 1 (with compression)	36 (49.32)
	Group 2 (Without Compression)	37 (50.68)
Primary outcome - recurrence	Yes	19 (26.03)
	No	54 (73.97)

The data showed 19 (26.03%) patients experienced recurrence: 5 in the compression therapy group and 14 in the Group 2. The tested difference in the distribution of patients with and without compression therapy between the groups with and without relapse was statistically significant (p=0.02). Patients on compression treatment had a significantly lower rate of disease recurrence compared to patients treated without compression (13.89% vs 37.84%, respectively) (Table 2).

Table 2: Primary outcome - recurrence rate between groups

Treatment group	Recurrence			p-level
	n(%)	Yes n (%)	No n (%)	
Group 1	36	5 (13.89)	31 (86.11)	X^2=5.43
Group 2	37	14 (37.84)	23 (62.16)	*p=0.0197

X^2(Chi-square test); *sig p<0.05.

Patients with and without relapse did not differ significantly in terms of gender (p=0.86) and in terms of age (p=0.16). The statistics showed 8 (25%) female and 11 (26.83%) male patients had a relapse; patients with a relapse were non-significantly older than patients without relapse (64.3 ± 10.1 vs 64.3 ± 10.1, respectively) (Table 3).

Length of hospital stay was significantly longer in patients with relapse (8.1 ± 1.5 vs 6.9 ± 1.2 days, respectively, *P*=0.0006) (Table 3).

Table 3: Comparison of demographics and hospital stay in patients with and without recurrence

Variable		Recurrence			p-level
		n	No n (%)	Yes n (%)	
Gender	Men	32	24(75.0)	8 (25.0)	X^2=0.03
	Women	41	30 (73.17)	11 (26.83)	p=0.86
Age	Mean ± SD		59.5 ± 13.4	64.3 ± 10.1	t=1.4
	Min- max		35 – 87	47 – 81	p=0.16
Length of hospital stay	Mean ± SD		6.9 ± 1.2	8.1 ± 1.5	t=3.6
	Min- max		4 - 9	6 - 12	***p=0.0006

X^2(Chi-square test); t(Studen t-test); **sig p<0.01; ***sig p<0.0001.

The measurement of the leg oedema on the first day of hospitalization averaged 43.68 ± 4.2 and 42.67 ± 4.5cm, in the group with and without compression, respectively, and the difference was not statistically significant (p=0.39). On the fourth day of hospitalization, the average calf circumference was 40.65 ± 4.3cm in patients with compressive therapy, 43.95 ± 4.4cm in patients without compression therapy. The difference of 3.3cm was statistically significant (p=0.005). On the fourth day of hospitalization in group 1, the circumference of the calf decreased by 4.7%, and in group 2 the circumeference of the calf increased on average by 0.6% (Table 4).

Table 4: Comparison of the leg oedema measurement in the treatment groups

Variable		Treatment group			p-level
		n	Group 1 n (%)	Group 2 n (%)	
Calf circumference Day 1	Mean ± sd		42.67 ± 4.5	43.68 ± 4.2	t=0.86
	Min- max		30 – 52	35 – 51	p=0.39
Calf circumference Day 4	Mean ± sd		40.65 ± 4.3	43.95 ± 4.4	t=2.9
	Min- max		29 – 51	34 – 53	**p=0.005

Discussion

A 2017 Cochrane database systematic review emphasize the importance of long-term antibiotic prophylaxis as a means of reducing recurrent cellulitis [13]. Clinical Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections by IDSA suggests administration of prophylactic antibiotics such as oral penicillin or erythromycin for 4–52 weeks, or intramuscular benzathine penicillin every 2–4 weeks, should be considered in patients who have 3–4 episodes of cellulitis per year [14]. However, experts also proclaim reduction and rigorous control of predisposing risk factors which is considered a crucial element in prevention of recurrent infection [6], [9], [13], [14]. Chronic leg edema is a key predisposing factor for recurrent cellulitis because it creates an environment of impaired skin integrity, lymphatic and venous dysfunction, inflammation, and reduced immunity [9]. This complex interplay makes individuals with chronic edema highly susceptible to cellulitis and its recurrence, underscoring the importance of effective management strategies such as compression therapy.

We performed randomized controlled study to evaluate whether use of compressive therapy will prevent recurrence of the cellulitis on the lower legs. Our study confirmed that using compressive treatment is associated with lower rate of disease recurrence compared to the standard treatment of cellulitis. In our study, in 19 (26.03%) patients the disease recurred, 5 using compression therapy and 14 without compression therapy. The tested difference in the distribution of patients with and without compression therapy between the groups with and without relapse was statistically significant (p=0.02). This result was in accordance with another study [15].

In our study, patients treated with compression therapy experienced more rapid resolution of the leg edema in contrast to Group 2 (those without compression therapy). On the fourth day during the hospital stay in patients treated with compressive therapy, the circumference of the calf in average decreased by 4.7%, and in group 2 the circumference of the calf increased on average by 0.6% (Table 4) The faster resolution of the leg oedema in group 1 could be the reason of shorter length of hospital stay also established in the group 1 (patients treated with compression therapy), which was in accordance with another study [16].

It's hypothesized that compression therapy prevent recurrence of cellulitis through multiple mechanism: it reduces oedema through improving lymphatic function, enhancement of the venous circulation by improving venous return, compression therapy also decreases venous stasis and associated inflammation. Enhanced circulation ensures better oxygen and nutrient delivery to tissues, promoting healing and reducing infection risk. Compression therapy helps maintain skin integrity by preventing swelling-induced skin damage, which also prevents subsequent bacterial entry. Compression therapy decreases the production of pro-inflammatory cytokines. This helps create a less inflammatory environment, reducing the risk of recurrent cellulitis episodes [9].

Conclusions

Compression therapy acts as both a preventative and a therapeutic measure by addressing the root causes of cellulitis recurrence—edema, impaired lymphatic function, venous stasis, and compromised skin integrity. Its benefits extend beyond infection prevention, improving overall limb health and

reducing the burden of chronic conditions like lymphedema and venous insufficiency. Our study confirmed that compressive therapy prevented recurrent episodes of cellulitis, and its role in treatment and prevention strategy in cellulitis should be further evaluated.

References

1. Levell NJ, Wingfield CG, Garioch JJ. Severe lower limb cellulitis is best diagnosed by dermatologists and managed with shared care between primary and secondary care. Br J Dermatol 2011; 164:1326-8. https://doi.org/10.1111/j.1365-2133.2011.10275.x PMid:21564054

2. Mcnamara DR, Tlyjeh IM, Berbari EF, Lahr BD, Martinez J, Mirzoyev SA, et al. A predictive model of recurrent lower extremity cellulitis in a population-based cohort. Arch Intern Med. 2007;167(7):709-15. https://doi.org/10.1001/archinte.167.7.709 PMid:17420430

3. Pavlotsky F, Amrani S, Trau H. Recurrent erysipelas: risk factors: Risikofaktoren für Rezidiverysipele. JDDG: Journal der Deutschen Dermatologischen Gesellschaft. 2004; 2(2):89-95. https://doi.org/10.1046/j.1439-0353.2004.03028.x PMid:16279242

4. Mason JM, Thomas KS, Crook AM, Foster KA, Chalmers JR, Nunn AJ, et al. Prophylactic antibiotics to prevent cellulitis of the leg: economic analysis of the PATCH I & II trials. PLoS One. 2014; 9:e82694. https://doi.org/10.1371/journal.pone.0082694 PMid:24551029 PMCid:PMC3925077

5. Thomas KS, Crook AM, Nunn AJ, Foster KA, Mason JM, Chalmers JR, et al. Penicillin to prevent recurrent leg cellulitis. N Engl J Med. 2013; 368:1695e703. https://doi.org/10.1056/NEJMoa1206300 PMid:23635049

6. Brishkoska-Boshkovski V, Kondova-Topuzovska I, Damevska K, Petrov A. Comorbidities as Risk Factors for Acute and Recurrent Erysipelas. Open Access Maced J Med Sci. 2019 Mar 30; 7(6):937-942. https://doi.org/10.3889/oamjms.2019.214 PMid:30976336 PMCid:PMC6454161

7. Brishkoska-Boshkovski V, Dimitrovska I, Kondova-Topuzovska I. Clinical Presentation and Laboratory Characteristics in Acute and Recurrent Erysipelas. Open Access Maced J Med Sci. 2019 Mar 15; 7(5):771-774. https://doi.org/10.3889/oamjms.2019.213 PMid:30962836 PMCid:PMC6447339

8. Karppelin M, Siljander T, Vuopio-Varkila J, Kere J, Huhtala H, Vuento R, Jussila T, Syrjanen J: Factors predisposing to acute and recurrent bacterial non-necrotizing cellulitis in hospitalized patients: a prospective case-control study. Clinical Microbiology & Infection. 2010; 16(6):729-34. https://doi.org/10.1111/j.1469-0691.2009.02906.x PMid:19694769

9. Cox NH. Oedema as a risk factor for multiple episodes of cellulitis/ erysipelas of the lower leg: a series with community follow-up. Br J Dermatol. 2006;155(5):947-50. https://doi.org/10.1111/j.1365-2133.2006.07419.x PMid:17034523

10. Chlebicki MP, Oh CC, Cc O. Recurrent cellulitis: risk factors, etiology, pathogenesis and treatment. Curr Infect Dis Rep 2014;16:422. https://doi.org/10.1007/s11908-014-0422-0 PMid:24980389

11. European Dermatology Forum (EDF) S3-Guideline for diagnostics and treatment of venous leg ulcers, Update 2014. http://www.euroderm.org/edf/index.php/edf-guidelines/ category/5-guidelines-miscellaneous [accessed July 4, 2016].

12. Swartz MN. Cellulitis. N Engl J Med 2004; 350: 904-12. https://doi.org/10.1056/NEJMcp031807 PMid:14985488

13. Dalal A, Eskin-Schwartz M, Mimouni D, Ray S, Days W, Hodak E, Leibovici L, Paul M. Interventions for the prevention of recurrent erysipelas and cellulitis. Cochrane Database of Systematic Reviews 2017, Issue 6. Art. No.: CD009758. https://doi.org/10.1002/14651858.CD009758.pub2 PMid:28631307

14. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJ, Gorbach SL, Hirschmann JV, Kaplan SL, Montoya JG, Wade JC; Infectious Diseases Society of America. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. Clin Infect Dis. 2014 Jul 15;59(2):e10-52. https://doi.org/10.1093/cid/ciu444

15. Webb E, Neeman T, Bowden FJ, Gaida J, Mumford V, Bissett B. Compression Therapy to Prevent Recurrent Cellulitis of the Leg. N Engl J Med. 2020 Aug 13;383(7):630-639. https://doi.org/10.1056/NEJMoa1917197 PMid:32786188

16. Kipsang Joseph, Nangole Wanjala, Khainga Stanley. Compression Therapy in The Management of Cellulitis: A Comparative Study. Journal of Surgery. Vol. 6, No. 3, 2018, pp. 68-72. https://doi.org/10.11648/j.js.20180603.13