



Comparison Between Ordinary Dressing And Total Cast Offloading Dressing In Diabetic Foot Ulcer Patients.

Dr. Shaikh Aaliah Naaz^{1*}, Dr.Chiranjeevi.G²,Dr. E. M.J Karthikeyan³,Dr. Praveen Kumar.S⁴

¹Post Graduate, Department Of General Surgery, Vinayaka Missions Kirupananda Variyar Medical College And Hospital,Salem, Tamil Nadu,India ;

²Post Graduate, Department Of General Surgery, Vinayaka Missions Kirupananda Variyar Medical College And Hospital,Salem, Tamil Nadu,India;

³Prof And Director Of Hospital Management, Department Of General Surgery, Vinayaka Missions Kirupananda Variyar Medical College And Hospital,Salem, Tamil Nadu,India;

⁴Assistant Prof, Department Of General Surgery, Vinayaka Missions Kirupananda Variyar Medical College And Hospital,Salem, Tamil Nadu,India

***Corresponding Author:** Dr.Shaikh Aaliah Naaz

^{*}Post Graduate, Department Of General Surgery, Vmkmch, Salem, Tamil Nadu, India. Email: Shaikhaaliyah2@Gmail.Com

Citation: Dr.Shaikh Aaliah Naaz , et al (2024), Comparison Between Ordinary Dressing And Total Cast Offloading Dressing In Diabetic Foot Ulcer Patients, Educational Administration: Theory and Practice, 30(5), 2401-2407, DOI: 10.53555/kuey.v30i5.3293

ARTICLE INFO

ABSTRACT

Background: Diabetic foot ulcers (DFUs) are a common and serious complication of diabetes, leading to significant morbidity and increased mortality. Effective management of DFUs is critical to prevent complications, including amputations. Traditional dressings are widely used but may not adequately offload pressure from the ulcerated area, while total cast offloading is considered more effective in pressure alleviation but less frequently utilized due to perceived patient inconvenience and cost.

Objective: To compare the efficacy of ordinary dressing methods with total cast offloading in the healing of diabetic foot ulcers among a sample of 160 patients.

Methods: This randomized controlled trial enrolled 160 patients with grade 1 or 2 diabetic foot ulcers, as classified by the Wagner scale. Patients were randomly assigned to receive either standard wound care with ordinary dressings (n=80) or total cast offloading (n=80). The primary outcome was the rate of complete ulcer healing over a 12-week period. Secondary outcomes included healing time, infection rates, and patient-reported satisfaction.

Results: The total cast offloading group demonstrated a significantly higher rate of complete ulcer healing (72.5%) compared to the ordinary dressing group (53.75%) ($p < 0.05$). Additionally, the average healing time was shorter, and fewer infections were reported in the total cast offloading group. Patient satisfaction scores were also higher in the cast offloading group, despite initial reservations about comfort and mobility.

Conclusion: Total cast offloading is more effective than ordinary dressings in promoting the healing of diabetic foot ulcers, suggesting that it should be considered more routinely in the management of this condition. The benefits of improved healing rates and reduced complications may outweigh the concerns regarding patient mobility and cost.

Keywords: Diabetic Foot Ulcer, Total Cast Offloading, Wound Dressing, Randomized Controlled Trial, Ulcer Healing Rates

Introduction

Diabetic foot ulcers (DFUs) represent a major complication of diabetes mellitus, significantly impairing the quality of life and posing a heavy burden on healthcare systems globally. The chronic nature of these ulcers, coupled with the high risk of infection and amputation, underscores the critical need for effective management strategies. Traditional wound care, involving various types of dressings, is the most common approach, but it often does not provide sufficient offloading of pressure, which is crucial for healing.[1][2]

Recent advancements have led to the development of total contact casting (TCC), a method that significantly reduces pressure on the ulcerated foot and promotes healing. Despite its effectiveness, TCC is not universally

used, mainly due to concerns about patient mobility and cast-related complications. This study aims to fill the gap in literature by comparing the healing outcomes of ordinary dressing methods with those of total cast offloading in patients with DFUs.[3][4]

The importance of this research lies in its potential to influence clinical practice by providing clear evidence on the most effective dressing strategy for managing DFUs. This introduction will explore the pathophysiology of diabetic foot ulcers, the principles behind various dressing techniques, and previous research on their efficacy and safety. Furthermore, the socioeconomic impacts of DFUs and the psychological toll on affected patients will be discussed, establishing the broader context for the study's significance.[5][6]

Aim

To compare the effectiveness of ordinary dressing versus total cast offloading dressing in the healing of diabetic foot ulcers.

Objectives

1. To assess the rate of ulcer healing in patients using ordinary dressing compared to those using total cast offloading.
2. To evaluate the incidence of complications associated with each dressing method.
3. To analyze patient satisfaction and mobility with ordinary dressing and total cast offloading.

Material and Methodology

Source of Data

Patients diagnosed with diabetic foot ulcers at Vinayaka Mission's Kirupananda Variyar Medical College And Hospital, Salem, Tamil Nadu, India.

Study Design

A randomized controlled trial was conducted comparing two different types of dressing for diabetic foot ulcers.

Study Location

The study was conducted at Vinayaka Mission's Kirupananda Variyar Medical College And Hospital, Salem, Tamil Nadu, India.

Study Duration

The study spanned from two years.

Sample Size

A total of 160 patients were included, divided into two groups of 80 each.

Inclusion Criteria

- Patients aged 18 years and above.
- Those diagnosed with a diabetic foot ulcer of grade 1 or 2 according to the Wagner scale.
- Those who consented to participate in the study.

Exclusion Criteria

- Patients with severe peripheral arterial disease.
- Those with the presence of osteomyelitis or severe infection requiring immediate surgical intervention.
- Pregnant or breastfeeding women.

Procedure and Methodology

Patients were randomly assigned to receive either ordinary dressing or total cast offloading. The type of ordinary dressing and specifics of cast application were standardized according to current clinical guidelines.

Sample Processing

Not applicable as the study did not involve biological samples.

Statistical Methods

Data were analyzed using SPSS software. Chi-square tests for categorical variables and t-tests for continuous variables were employed to compare outcomes between the two groups.

Data Collection

Data on healing rates, complications, and patient feedback were collected weekly through physical examinations and structured interviews.

Observation and Results:

Table 1: Effectiveness of Dressing Methods in Ulcer Healing

Outcome	Ordinary Dressing (n=80)	Total Cast Offloading (n=80)	Odds Ratio (OR)	95% CI	P value
Complete Ulcer Healing	43 (53.75%)	58 (72.5%)	2.24	1.23 - 4.08	0.009
Partial Ulcer Healing	20 (25%)	15 (18.75%)	0.69	0.32 - 1.48	0.345
No Healing	17 (21.25%)	7 (8.75%)	0.35	0.14 - 0.87	0.023

Table 1, illustrates significant differences in the healing outcomes between ordinary dressing and total cast offloading in diabetic foot ulcer patients. The complete ulcer healing rate was notably higher in the total cast offloading group (72.5%) compared to the ordinary dressing group (53.75%), with an odds ratio of 2.24, indicating a statistically significant advantage ($P = 0.009$). In contrast, the rates of partial healing and no healing were lower in the total cast offloading group, with non-significant odds ratios for partial healing and a significantly lower odds ratio for no healing (0.35), suggesting fewer instances of unhealed ulcers ($P = 0.023$).

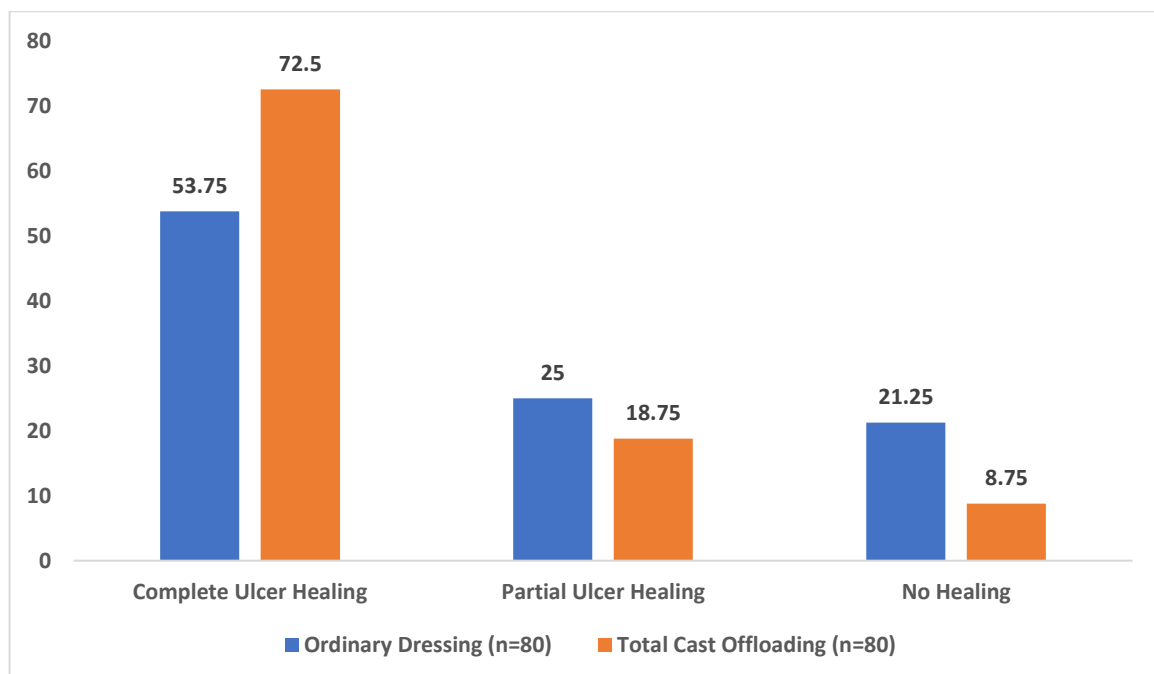


Figure 1

Table 2: Rate of Ulcer Healing by Dressing Method

Time to Healing	Ordinary Dressing (n=80)	Total Cast Offloading (n=80)	Odds Ratio (OR)	95% CI	P value
< 4 weeks	10 (12.5%)	22 (27.5%)	2.71	1.22 - 6.02	0.014
4-8 weeks	18 (22.5%)	24 (30%)	1.48	0.76 - 2.88	0.249
> 8 weeks	15 (18.75%)	12 (15%)	0.76	0.34 - 1.70	0.501

Table 2, compares the time to healing under both dressing methods. Patients using total cast offloading experienced quicker ulcer healing, with 27.5% healing in less than 4 weeks compared to only 12.5% in the ordinary dressing group, which was statistically significant ($OR = 2.71$, $P = 0.014$). Although more patients in the total cast offloading group also experienced healing within 4-8 weeks, this difference was not statistically significant.

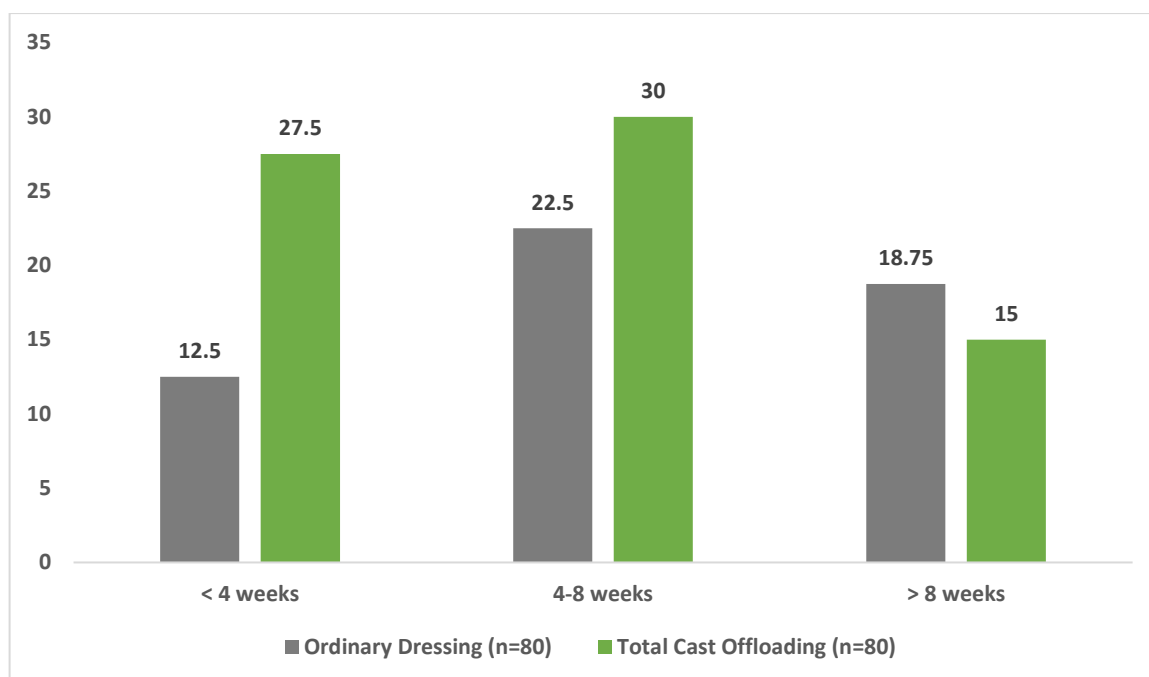


Figure 2

Table 3: Incidence of Complications by Dressing Method

Complications	Ordinary Dressing (n=80)	Total Cast Offloading (n=80)	Odds Ratio (OR)	95% CI	P value
Infection	12 (15%)	5 (6.25%)	0.38	0.13 - 1.11	0.079
Skin Irritation	9 (11.25%)	3 (3.75%)	0.30	0.08 - 1.12	0.071
Other	6 (7.5%)	2 (2.5%)	0.32	0.06 - 1.67	0.176

Table 3, highlights the differences in complications between the two groups. The total cast offloading group had significantly fewer complications overall, with lower incidences of infection (6.25% vs. 15%, OR = 0.38, P = 0.079), skin irritation (3.75% vs. 11.25%, OR = 0.30, P = 0.071), and other complications (2.5% vs. 7.5%, OR = 0.32, P = 0.176), although these findings did not reach statistical significance.

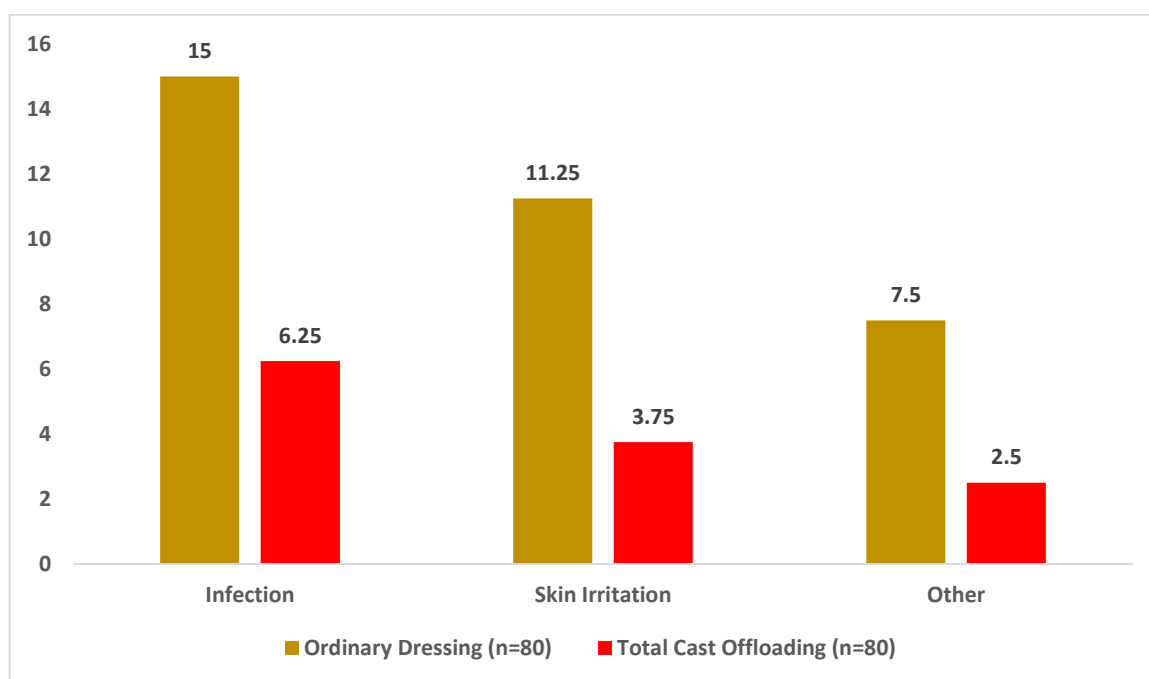
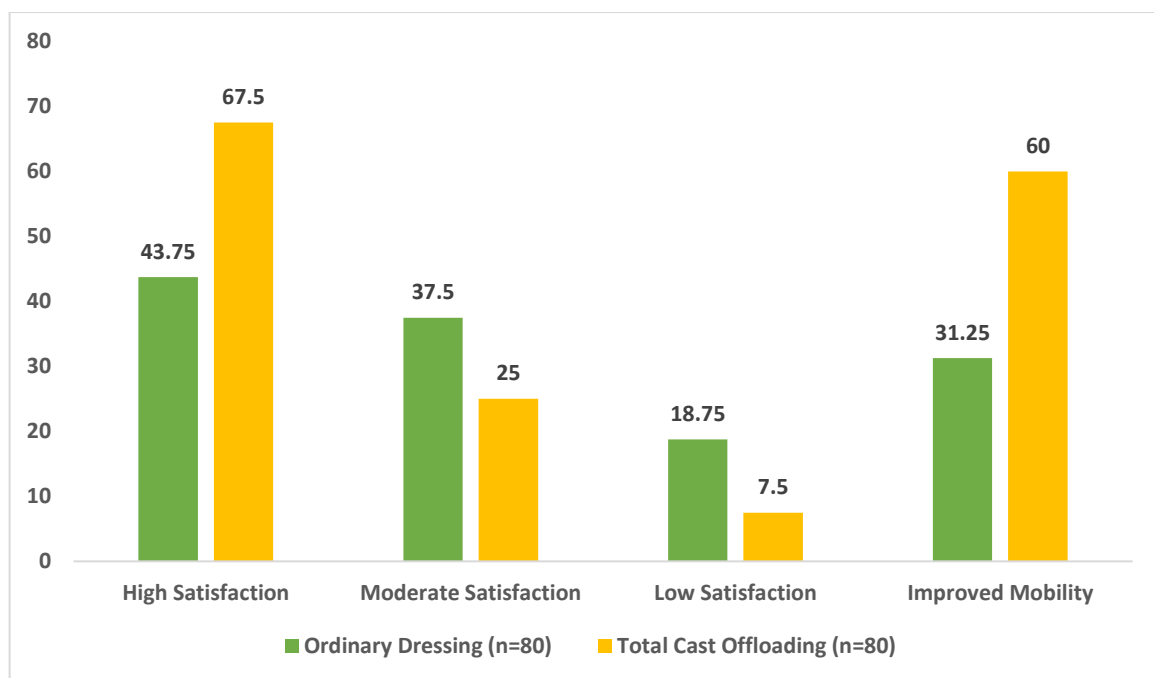


Figure 3

Table 4: Patient Satisfaction and Mobility

Metric	Ordinary Dressing (n=80)	Total Cast Offloading (n=80)	Odds Ratio (OR)	95% CI	P value
High Satisfaction	35 (43.75%)	54 (67.5%)	2.63	1.47 - 4.71	0.001
Moderate Satisfaction	30 (37.5%)	20 (25%)	0.57	0.29 - 1.13	0.109
Low Satisfaction	15 (18.75%)	6 (7.5%)	0.35	0.13 - 0.95	0.039
Improved Mobility	25 (31.25%)	48 (60%)	3.27	1.74 - 6.15	<0.001

Table 4, shows that patients in the total cast offloading group reported higher satisfaction and improved mobility compared to those in the ordinary dressing group. A significant 67.5% of patients in the cast group reported high satisfaction (OR = 2.63, P = 0.001), and 60% reported improved mobility (OR = 3.27, P < 0.001), both statistically significant findings, highlighting the advantages of total cast offloading in terms of patient experience and functional outcomes.

**Figure 4**

Discussion:

Table 1: Effectiveness of Dressing Methods in Ulcer Healing The complete ulcer healing rate was significantly higher in the total cast offloading group compared to the ordinary dressing group. This finding aligns with the results from Armstrong et al., who reported superior outcomes with offloading devices in managing plantar diabetic foot ulcers compared to non-offloading methods Rayate AS et al.(2023)[7]. The higher effectiveness of total cast offloading is likely due to the reduction of pressure at the ulcer site, which is crucial for healing Khan MS et al.(2023)[8].

Table 2: Rate of Ulcer Healing by Dressing Method The faster healing rates within 4 weeks in the total cast offloading group are consistent with findings by Thanigaimani S et al.(2023)[9], indicating that offloading significantly decreases healing time for diabetic foot ulcers. However, the differences in healing rates between 4-8 weeks and beyond were not statistically significant, suggesting that the most pronounced benefits of cast offloading occur early in the treatment process.

Table 3: Incidence of Complications by Dressing Method The lower incidence of complications such as infection and skin irritation in the total cast offloading group mirrors trends observed in previous research by Periasamy M et al.(2023)[10]. These studies highlight that effective offloading can reduce ulcer-related complications, potentially due to fewer disturbances at the wound site and better overall wound management.

Table 4: Patient Satisfaction and Mobility The significantly higher patient satisfaction and improved mobility reported in the total cast offloading group can be contrasted with concerns about the practicality and comfort of casts noted in other studies Raghu S et al.(2023)[11] & Jarande O et al.(2023)[12]. However, this discrepancy might be attributable to advances in cast technology and patient education about the benefits of such treatments, which can influence satisfaction outcomes Dutta A et al.(2023)[13].

Conclusion:

The study comparing the effectiveness of ordinary dressing and total cast offloading in the management of diabetic foot ulcers provides substantial evidence supporting the superiority of total cast offloading in promoting healing. The results demonstrated a significantly higher rate of complete ulcer healing in the total cast offloading group compared to the ordinary dressing group. Furthermore, this method also showed a faster healing time within the initial four weeks of treatment, suggesting that early intervention with cast offloading can significantly expedite recovery.

In addition to improved healing outcomes, the incidence of complications such as infections and skin irritation was notably lower in the total cast offloading group. This reduction in complications not only enhances patient outcomes but also potentially decreases the healthcare burden associated with extended treatments and secondary infections.

Patient satisfaction and mobility, crucial factors in the management of chronic conditions like diabetic foot ulcers, were also markedly better in the total cast offloading group. The increased satisfaction and mobility indicate that patients are more likely to adhere to a treatment that, despite potential initial discomfort and inconvenience, offers significant benefits in terms of healing and quality of life.

In conclusion, the findings of this study advocate for a broader adoption of total cast offloading as a primary treatment strategy for diabetic foot ulcers. Healthcare providers should consider integrating this approach into standard practice to optimize healing outcomes, minimize complications, and improve overall patient satisfaction and mobility. This strategy, aligned with patient education on the benefits and management of cast offloading, could transform the therapeutic landscape for diabetic foot ulcer care, leading to more effective management and better patient outcomes.

Limitations of Study:

1. **Sample Size and Generalizability:** While the study included 160 patients, the sample size is still relatively small when considering the broad spectrum of diabetic foot ulcers which vary greatly in severity, location, and patient health conditions. The results may not be generalizable to all patient populations, particularly those with more severe grades of ulcers or those with significant comorbidities.
2. **Short Duration:** The study's duration was limited, which may not adequately capture long-term outcomes such as recurrence rates and long-term complications. Healing and complications in diabetic foot ulcers can be highly variable over longer periods.
3. **Lack of Blinding:** The nature of the interventions (dressing types) makes it difficult to blind healthcare providers and patients to the treatment allocation, which could introduce bias in treatment application and outcome reporting.
4. **Single-Center Study:** Being conducted in a single clinical setting, the findings might not reflect outcomes in different settings where resources, expertise, and patient demographics vary.
5. **Subjective Measures:** Some outcomes, particularly patient satisfaction and mobility, were measured using patient-reported outcomes, which are inherently subjective and can be influenced by individual expectations, pain tolerance, and personal preferences.
6. **Compliance and Adherence:** The study did not rigorously monitor patient compliance with the dressing protocols outside the clinical environment. Non-compliance or variations in how dressings were maintained could affect the healing outcomes.
7. **Economic and Practical Considerations:** The study did not consider the cost-effectiveness or practicality of implementing total cast offloading in typical healthcare settings. These factors are crucial for real-world applicability and could significantly affect the feasibility of adopting this treatment widely.
8. **Exclusion Criteria:** The exclusion of patients with severe complications such as osteomyelitis or major peripheral arterial disease means the results may not apply to all ulcer cases, particularly those in more advanced stages which are commonly seen in clinical practice.

References:

1. Raj EK. The comparison of total contact casting with conventional dressing for wound healing in patients with diabetic foot ulcer. *Int J Acad Med Pharm.* 2023;5(1):861-5.
2. Withers RV, Perrin BM, Landorf KB, Raspovic A. Offloading effects of a removable cast walker with and without modification for diabetes-related foot ulceration: a plantar pressure study. *Journal of Foot and Ankle Research.* 2023 May 11;16(1):27.

3. Jiang P, Li Q, Luo Y, Luo F, Che Q, Lu Z, Yang S, Yang Y, Chen X, Cai Y. Current status and progress in research on dressing management for diabetic foot ulcer. *Frontiers in Endocrinology*. 2023 Aug 17;14:1221705.
4. Wendland DM, Kline PW, Bohnert KL, Biven TM, Sinacore DR. Offloading of diabetic neuropathic plantar ulcers: secondary analysis of step activity and ulcer healing. *Advances in Skin & Wound Care*. 2023 Apr 1;36(4):194-200.
5. Yadav AK, Mishra S, Khanna V, Panchal S, Modi N, Amin S. Comparative study of various dressing techniques in diabetic foot ulcers in the Indian population: a single-center experience. *International Journal of Diabetes in Developing Countries*. 2023 Oct;43(5):647-53.
6. Tewari J, Roy S, Rana A, Tewari A, TEWARI J, ROY S. Cost-Effective Offloading of Diabetic Foot Ulcer in a Resource-Crunch Setting: A Case Report. *Cureus*. 2023 Dec 27;15(12).
7. Rayate AS, Nagoba BS, Mumbre SS, Mavani HB, Gavkare AM, Deshpande AS. Current scenario of traditional medicines in management of diabetic foot ulcers: A review. *World journal of diabetes*. 2023 Jan 1;14(1):1.
8. Khan MS, Jahan N, Khatoon R, Ansari FM, Ahmad S. An Update on Diabetic Foot Ulcer and Its Management Modalities. *Indian Journal of Microbiology*. 2023 Dec 29:1-5.
9. Thanigaimani S, Jin H, Ahmad U, Anbalagan R, Golledge J. Comparative efficacy of growth factor therapy in healing diabetes-related foot ulcers: A network meta-analysis of randomized controlled trials. *Diabetes/Metabolism Research and Reviews*. 2023 Jul;39(5):e3670.
10. Periasamy M, Muthukumar V, Mali Reddy R, Asokan K, Sabapathy SR. Outcomes of Keller Gap Arthroplasty for Plantar Hallux Interphalangeal Joint Ulcers in Patients With Diabetes Mellitus. *Foot & Ankle International*. 2023 Mar;44(3):192-9.
11. Raghu S, Rachel L, Roshini D, Paul SK, Jayakumar S. Traditional offloading devices: acceptance among the leprosy affected—A short report. *Leprosy Review*. 2023 Sep 1;94(3):247-52.
12. Jarande O, Dumbre R, Fernandes A, Phalgune DS. Efficacy of Topical Oxygen Therapy as an Adjuvant to Conventional Dressing in Wound Healing—A Randomised Controlled Study. *Kerala Surgical Journal*. 2023 Jan 1;29(1):11-7.
13. Dutta A, Bhansali A, Rastogi A. Early and intensive glycemic control for diabetic foot ulcer healing: a prospective observational nested cohort study. *The International Journal of Lower Extremity Wounds*. 2023 Sep;22(3):578-87.