



Diabetic foot ulcer research activity (2004–2020)

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Welcome to the first *Diabetes Digest* commentary of 2022. Once again, please take the time to read the abstracts and I urge you to read the full papers of any that interests you.

The paper I have chosen for this commentary is not a clinical research paper, but hopefully one that will stimulate everyone whether from a clinical, educational, managerial or industry-based workplaces. It is from China, reviewing the global trends for research activity and hotspots in diabetic foot ulceration (DFU). It examined the DFU research activity using the Science Citation Index Expanded (SCI-expanded) of Web of Science Core Collection (WoSCC) using key words, such as 'diabetic foot ulcer' or 'diabetic foot wound'. This database was used as it was deemed to cover most of the high impact and quality international scientific journals. The information of all identified publications included title, year of publication, author, affiliations, nationalities, journal, abstract and keywords. A total of 5,869 publications on DFUs were identified covering a 17-year period (2004 to 2020), which was divided into three equal time intervals: 2004–2009, 2010–2015 and 2016–2020. There were 4,500 research and 865 review articles from a total of 100 countries. Three-quarters of these publications came from eight countries, with the US publishing the most papers, followed by China, England, Germany, Italy, France, Canada and Sweden. Among them, the US contributed to the most publications ($n=1,866$), followed by England ($n=606$), China ($n=599$), and

Germany ($n=336$). The highest citation rates were USA ($n=50,308$), UK ($n=16,967$), Netherlands (7,101), China (7,001) and Germany (5,871). *Diabetes Care* was the cited journal, suggesting it may be the key quality journal. There was a slow but significant publication increase from 119 (2004) to 355 (2015) with a greater increase thereafter but a sharp increase from 562 (2019) to 703 (2020). The top three authors were David Armstrong (US) with 91 papers, Lawrence Lavery (US) with 55 papers and Sicco Bus (Netherlands) with 46 papers. The University of Washington (USA) had the greatest number of publications with 103 papers, followed by the University of Manchester (UK) with 94 papers and the University of Miami (USA) with 92 papers. Perhaps an important feature of this paper is that it suggests five potential future research areas from the keyword co-occurrence relationship analysis: rehabilitation study, surgery, complications, molecular mechanisms and clinical studies. Obviously, this paper only reflects DFU publications and perhaps gives a glimpse of an encouraging and increasing trend for ongoing research in this, and perhaps other, diabetic foot research. It also highlights the need for a sustained growth in our knowledge and understanding of this challenging and increasing clinical area. I hope this encourages individuals, institutions and industry to increase support and facilitate research in the diabetic foot. ■

Deng P, Shi H, Pan X et al (2022) Worldwide research trends on diabetic foot ulcers (2004–2020): suggestions for researchers. *J Diabetes Res* 2022: 7991031. ecollection 2022

Adv Wound Care

Re-ulceration is common in persons with diabetes and healed foot ulcer after participant-driven education in group: a randomized controlled trial

Readability ✓✓✓✓

Applicability to practice ✓✓✓✓

WOW! Factor ✓✓✓✓

1 The authors set out to compare the number of ulcer-free days that individuals with diabetes and a healed foot ulcer below the ankle experienced during a period of 24 months when one group were provided with adjusted therapeutic shoes, standard information and participated in participant-driven group education, while the other were provided with standard information alone.

2 A randomized controlled trial was used to evaluate the number of ulcer-free days in both cohorts. A total of 138 persons with diabetes and previously healed foot ulcer were recruited (age median 63 years [34–79], 101 men/37 women) and 107 (77.5%) completed the study, 7 (5%) dropped out, and 12 (9%) were deceased.

3 No statistically significant difference was found between the intervention group compared with the control group after 6, 18, or 24 months. After 12 months, more patients in the intervention group had developed ulcers.

4 In conclusion, patient-driven education in groups did not give better results than standard information in this underpowered study. The challenges to perform comparative preventive studies in this group of patients with extensive comorbidity were illustrated.

Gershater MA, Apelqvist J, Roijer CA (2022) Re-ulceration is common in persons with diabetes and healed foot ulcer after participant-driven education in group: a randomized controlled trial. *Adv Wound Care (New Rochelle)* doi: 10.1089/wound.2021.0007. [Online ahead of print]

Int Wound J

Multi-centre prospective randomised controlled clinical trial to evaluate a bioactive split thickness skin allograft vs standard of care in the treatment of diabetic foot ulcers

Readability ✓✓✓
 Applicability to practice ✓✓✓
 WOW! Factor ✓✓✓

- Advanced wound therapies including human skin allografts have shown promise in treating diabetic foot ulcers (DFUs). A randomised, prospective study was conducted to compare the response of 100 subjects with non-healing DFUs. Fifty were treated with a cryopreserved bioactive split-thickness skin allograft (BSA) compared with 50 subjects treated with standard of care (SOC) at 12 weeks.
- Individuals in the two groups received standardised care. The aim was to find out the proportion of full-thickness wounds healed at 12 weeks, while secondary endpoints included differences in percent area reduction (PAR) at 12 weeks, changes in Semmes-Weinstein monofilament score, VAS pain and w-QoL.
- A total of 76% (38/50) of the BSA-treated DFUs healed compared with 36% (18/50) treated with SOC alone. Mean PAR at 12 weeks was 77.8% in the BSA group compared with 49.6% in the SOC group.
- Adding BSA to SOC significantly improved wound healing with a lower incidence of adverse events related to treatment compared with SOC alone.

Armstrong DG, Galiano RD, Orgill DP et al (2022) Multi-centre prospective randomised controlled clinical trial to evaluate a bioactive split thickness skin allograft vs standard of care in the treatment of diabetic foot ulcers. *Int Wound J*. doi: 10.1111/iwj.13759 [Online ahead of print]

Cell Biol Int

Contribution of peripheral neuropathy to poor bone health in the feet of people with type 2 diabetes mellitus

Readability ✓✓✓
 Applicability to practice ✓✓✓
 WOW! Factor ✓✓✓

- The aim of the study was to evaluate the impact of peripheral neuropathy on bone health in people with type 2 diabetes mellitus (T2DM).
- Participants with T2DM were grouped according to the presence of peripheral neuropathy as assessed by vibration perception threshold (VPT). The groups were balanced for age, sex and body mass index (BMI).
- Thirty-four participants (17 per group; mean age 68 ± 12 years, 47% male, with median BMI 29.9 (IQR 26.9 – 32.7) kg/m^2). The peripheral neuropathy group had significantly lower mean stiffness Index, speed of sound and a trend towards lower Broadband Ultrasound Attenuation. Calcaneal QUS parameters all correlated negatively with VPT, while broadband ultrasound attenuation showed independent negative correlation with diabetes duration.
- Those with T2DM and peripheral neuropathy have poorer bone health as measured by calcaneal QUS than those without peripheral neuropathy, independent of age, sex and BMI.

Lasschuit JWJ, Greenfield JR, Tonks KTT (2021) Contribution of peripheral neuropathy to poor bone health in the feet of people with type 2 diabetes mellitus. *Acta Diabetol* 1–8 [Online ahead of print]

Int J Neurosci

Acute short term effects of endurance and resistance training on balance control in patients with diabetic peripheral neuropathy

Readability ✓✓✓
 Applicability to practice ✓✓✓
 WOW! Factor ✓✓✓

- This study aims to assess the Acute Short Term effects of endurance and resistance exercise training on balance control in diabetic peripheral neuropathy (DPN) patients, given that exercise training has numerous beneficial effects on the complications of DPN.
- Eleven patients with DPN and 11 healthy subjects were enrolled in the study and all undertook endurance and resistance training in two separate exercise sessions. Both a dynamic balance and functional balance test were assessed before and after the interventions.
- Results showed that dynamic and functional balance in DPN patients were significantly lower than in healthy subjects. The anterior-posterior stability and total stability indices and functional balance test deteriorated significantly after training.
- It was concluded that endurance or resistance training may lead to acute disturbance of dynamic and functional balance in DPN patients. Therefore, immediately after exercise, patients with diabetes are at an increased risk of falling and preventive considerations should be put in place.

Shahrjerdi S, Bahrpeyma F, Bagherian SA (2022) Acute short term effects of endurance and resistance training on balance control in patients with diabetic peripheral neuropathy. *Int J Neurosci*.doi: 10.1080/00207454.2022.2033739. [Online ahead of print]

“Five potential future research areas from the keyword co-occurrence relationship analysis are: rehabilitation study, surgery, complications, molecular mechanisms and clinical studies.”