The effect of diabetes on functional outcomes among individuals with distal radial fractures

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INTRODUCTION

- Fractures of the distal radius (DRFs) cause pain, muscle weakness and loss of function.[1]
- DRFs are treated with surgery and physical therapy.[1]
- Factors such as age, sex, education level, and diabetes may affect recovery.[1,2]
- Diabetes increases the incidence of fracture and delays fractures healing.[3]
- Diabetic neuropathy and impaired vision are risk factors for falls which increase the risk of fractures.[3]
- Limited studies evaluated the effect of diabetes on hand functional outcomes after DRFs.

OBJECTIVE

The aim of this study was to address the effect of diabetes on functional outcomes (pain, hand disability), physical health status, grip strength and wrist and forearm ROM over the recovery period of DRFs: baseline (B), 3-month and 1-year.

MATERIAL AND METHODS

- **Study design:** Prospective cohort
- **Participants:** Patients with DRFs
- **Setting:** Roth McFarlane Hand and Upper Limb Centre at St. Joseph's Health Care in London, Ontario.
- **Evaluation tools:**
  - Patient Rated Wrist Evaluation (PRWE) questionnaire assessed pain and hand function.
  - SF-12 questionnaire assessed physical health status.
  - Wrist and forearm ROMs were measured in flexion/extension, radial/ulnar deviations, and pronation/supination.
  - Grip strength was assessed using N-K DIGIT-Grip device.

Characteristics	PRWE	SF-12	Grip strength and ROM
Total (n)	479	289	550
Age	55±14 (18-87 y)	60±12 (20-87 y)	57±14 (18-83 y)
Sex: Male Female	122 (25.5%) 357 (74.5%)	60 (20.8%) 229 (79.2%)	136 (24.7%) 414 (75.3%)
Diabetes	48 (10%)	20 (6.9%)	43 (7.8%)

PRWE: Patient Rated Wrist Evaluation; ROM: Range of Motion; y: years.

RESULTS

Primary outcome:

- There was a significant improvement over time ($p < 0.01$), and between each time point ($p < 0.05$), on the PRWE total score and on each PRWE subscale (pain, specific activity, and usual activity; $p < 0.01$) as shown in Table 2.

Secondary outcomes:

- Results revealed a significant improvement over time ($p < 0.01$), and between each time point ($p < 0.05$), on physical health status, grip strength, and wrist and forearm ROM as shown in Table 2.

Table 2: One-year changes in functional outcomes, physical health status, grip strength, and wrist and forearm ROM for patients with diabetes and the rest of the cohort

Questionnaire	Baseline		3-month		1-year	
	Diabetes		Diabetes		Diabetes	
	Yes	No	Yes	No	Yes	No
PRWE Pain Specific activities Usual activities Total score	31 (12) 51 (11) 27 (10) 69 (19)	33 (10) 55 (10) 31 (8) 76 (15)	**19 (11)*÷** **21 (15)*÷** **11 (9)*÷** **35 (21)*÷**	**19 (11)** **23 (16)** **12 (10)** **37 (22)**	**14 (12)*÷** **14 (14)*÷** **7 (8)*÷** **25 (22)*÷**	**12 (11)** **10 (13)** **6 (8)** **20 (20)**
SF-12 Physical health status	36 (12)	39 (9)	**44 (10)***	**45 (8)**	**45 (12)***	**50 (9)**
Grip strength	----	----	14 (7)	15 (9)	**24 (10)***	**24 (10)**
ROM (°) Flexion Extension Radial deviation Ulnar deviation Pronation Supination	---- ---- ---- ---- ---- ----	---- ---- ---- ---- ---- ----	42 (14) 45 (11) 16 (7) 21 (8) 73 (10) 58 (17)	43 (15) 46 (13) 15 (6) 20 (8) 73 (11) 61 (17)	**49 (15)*** **52 (11)*** **18 (7)*** **25 (7)*** **77 (9)*** **65 (14)***	**54 (14)** **53 (12)** **17 (7)** **24 (8)** **78 (9)** **70 (12)**

Mean (SD) * significant effect of time ($p < 0.05$), ÷ significant interaction between diabetes and time ($p < 0.05$). PRWE: Patient Rated Wrist Evaluation; ROM: Range of Motion.

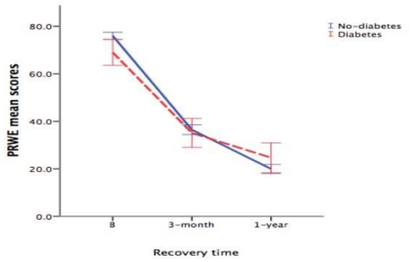

Figure 1: Scores of functional outcomes for patients with diabetes versus patients without diabetes assessed using the Patient Rated Wrist Evaluation (PRWE) questionnaire at baseline, 3-month, and 1-year after distal radius fracture with 95% CI error bars. The significant interaction between time and diabetes indicates a slower recovery of patients with diabetes.

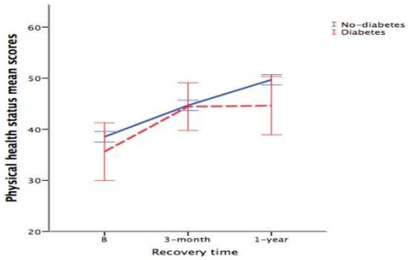

Figure 2: Scores of physical health status for patients with diabetes versus patients without diabetes assessed using the SF-12 questionnaire at baseline, 3-month, and 1-year after distal radius fracture with 95% CI error bars. Despite the insignificant interaction between time and diabetes, patients with diabetes had poorer physical health status.

CONCLUSION

Although the differences between patients with diabetes and the rest of the cohort were small to moderate, there was an adverse impact of diabetes on pain, hand function, and physical health status after DRFs.

ACKNOWLEDGEMENT

This study was funded by CIHR FRN 122070. Joy C MacDermid was supported by a CIHR Chair in Gender, Work and Health and the Dr. James Roth Research Chair in Musculoskeletal Measurement and Knowledge Translation during the conduct of this study.

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