Supplementary Table S1. Summaries of previous studies on the association between spinal cord injury (SCI) and diabetes mellitus (DM)

Author (et al.)	Year	Country/ Cohort	Subjects with SCI (N)	Subjects without SCI (N)	Mean age (years±SD)	SCI type	Mean follow-up (years)	Outcome assessment	Adjustment for covariates	Outcome	Significance
Cross-sectional study											
Jörgensen	2019	Sweden Swedish Aging with Spinal Cord Injury Study (SASCIS)	123 (total) 87 (male) 36 (female)	-	63±9	Duration: Chronic, 24±12 years Etiology: Not specified Level: C1-L5 Extent: AIS A-D	-	Interview, medical record	-	**T2DM prevalence** 16%: previous history of DM 15%: fasting glucose ≥ 7 mmol/L	The high occurrence of cardiovascular risk factors among older adults with long-term SCI. Regular assessments and interventions targeting cardiovascular risk are warranted.
Cragg	2013	Canada Canadian Community Health Survey (CCHS) 2010 Annual Component.	353 (total)	60,325	40–44 (median)	Duration: Not specified Etiology: Not specified Level: Not specified Extent: Not specified	-	Interview	aOR1 age, sex aOR2 aOR1+ sex, BMI aOR3 aOR2+ HTN, smoking, alcohol intake, daily physical activity, daily fruits/vegetables intake	**T2DM prevalence** ● Non-SCI 5.91% ● SCI 13.66% **T2DM ORs** ● Non-SCI aOR 1.00 (ref.) ● SCI unadjusted OR 2.52 (95%CI: 1.81, 3.52) aOR1 1.66 95%CI: 1.16, 2.36) aOR2 1.65 95%CI: 1.13, 2.42) aOR3 2.45 (95%CI: 1.34, 4.47)	There is a strong association between SCI and T2DM.
LaVela	2012	USA Paralyzed Veterans of America membership/CDC BRFSS database	794 (male)	Non-SCI Veteran 13,528 (men) General population 6,105 (men)	SCI 74 Non SCI veteran 74 Non SCI general population 73	Duration: Chronic (≥20yr) Etiology: Not specified Level: Tetraplegia Paraplegia Extent: Not specified	-	Self-reported assessment (SCD-HCQ, BRFSS)	Age, race, education, marital status, smoking, drinking, high blood pressure, high cholesterol level, group status (SCI vs non-SCI veteran, SCI vs general population)	**DM prevalence** ● General population 17.86% ● Non-SCI veteran 19.26% ● SCI 20.30% **DM aORs** ● Non-SCI veteran aOR 1.00 (ref.) ● SCI aOR 0.98 (95%CI: 0.80, 1.20) ● General population aOR 1.00 (ref.) ● SCI aOR 1.16 (95%CI: 0.93, 1.45)	Prevalence of DM among older adult men with SCI is similar to that of other older adult men.

Case-control study											
Selassie A.	2013	USA 62 acute care nonfederal hospitals in South Carolina * Multicenter	1,776 (total) 1,408 (male) 368 (female)	1,780 (LEF total) 1,098 (LEF male) 682 (LEF female)	SCI 38.8±15.0 LEF 35.1±16.4	Duration: Acute Etiology: Traumatic Level: Not specified Extent: ISS (1-75)	12	ICD-9-CM	ISS	**DM aOR** OR 1.68 (95%CI: 1.01, 2.79)	Patients with traumatic SCI have significantly higher odds of DM, heart disease, hypertension, and obesity than persons with LEF at the onset of SCI.
Prospective cohort study											
Solinsky R.	2022	USA 5 National Institute on Disability, Independent Living, and Rehabilitation Research Model SCI Rehabilitation Centers * Multicenter	98 (total) 78 (male) 17 (female)	1,609 (total) 1,311 (male) 298 (female)	SCI 37.3±13.9 Control 37.8±14.4	Duration: Acute (2.7±1.1mo) Etiology: Traumatic Level: C2-L2 (C2-8, T1-6, T7-L2) Extent: AIS A-D	-	Medical record Fasting serum (mg/dL) Insulin (uIU/mL) HbA1C (%)	-	**Insulin resistance prevalence** ● Control 42.0% ● SCI 37.5% - Elevated fasting glucose: 12.5% - HOMA(v.2) criteria: 33.3%	Insulin resistance was not significantly different between patients with SCI and the controls.
Retrospective cohort study											
Cao Y.	2020	USA South Carolina SCI Surveillance Registry (SCSCISR) (2010-2013)	501 (total) 70% (male) 30% (female)	-	41.84±17.41 (at injury year)	Duration: Chronic (≥1yr) Etiology: Traumatic Level: C1-C4 C5-C8 Non-cervical Extent: Not specified	4.3±1.0	Self-reported assessment (BRFSS)	-	**DM prevalence** 14% (baseline) 17% (follow-up)	Chronic health conditions including DM were common among adults with traumatic SCI and increased significantly over time.
DiPiro N.D.	2019	USA South Carolina SCI Surveillance Registry (SCSCISR)	787 (total) 568 (male) 219 (female)	-	49.7±16.7	Duration: Chronic (≥1yr) Etiology: Traumatic Level/Extent: C1–C4, non-ambulatory C5–C8, non-ambulatory Non-cervical, non-ambulatory Ambulatory (any	Not specified	Self-reported assessment (BRFSS) Administrative billing data	-	**DM prevalence** 15.8%	Chronic health conditions including DM were common among adults with traumatic SCI.

						level, able to walk < 1000 feet) Ambulatory (any level, able to walk >1000 feet)					
Peterson	2021	USA Private insurance claims database, Clinformatics DataMart Database (OptumInsight, Eden Prairie, MN).	9,081 (total) 3,829 (male) 5,252 (female)	1,474,232 (total) 699,950 (male) 774,282 (female)	SCI 18–44yr: 15.2% 45–64 yr: 28.0% ≥65 yr: 56.7% Control 18–44yr: 34.8% 45–64 yr: 34.8% ≥65 yr: 28.5	Duration: Not specified Etiology: Traumatic Level/Extent: Not specified	SCI 6.0±1.7 Control 5.3±1.5	ICD-9-CM	Model 1: Unadjusted Model 2: age, sex, race, geographic region Model 3: Model 2+Modified Elixhauser Comorbidity Index Model 4: Model 3+education, income	**DM incidence** ● Control 9.2% HR 1.00 (ref.) ● SCI 15.9% Model 1: HR 1.72 (95%CI: 1.62-1.83) Model 2: HR 1.16 (95%CI: 1.09-1.24) Model 3: HR 0.99 (95%CI: 0.94-1.06) Model 4: HR 1.00 (95%CI: 0.94-1.06)	Adults with SCIs have a significantly higher incidence of and risk for common cardiometabolic morbidities, as compared to adults without SCIs.
Lai Y.J.	2014	Taiwan Taiwan's National Health Insurance Research Database (1997-2010)	52,420 (total) 33,312 (male) 19,108 (female)	209,680 (total) 133,248 (male) 76,432 (female)	SCI 51.7±18.3 Control 51.6±18.3	Duration: Not specified Etiology: Not specified Level/Extent Cervical, Complete thoracic, Incomplete thoracic, Lumbar/sacral/ coccygeal (L-S-Co)	SCI 5.98 Control 6.50	ICD-9-CM (codes 250)	Age, sex, comorbidity	**DM incidence** ● Control HR 1.00 (ref.) ● SCI HR 1.33 (95%CI: 1.22-1.45) **DM incidence by level of injury** ● Control HR 1.00 (ref.) ● Cervical HR 1.20 (95%CI: 1.06, 1.36) ● Complete thoracic HR 2.35 (95%CI: 1.05, 5.23) ● Incomplete thoracic HR 1.60 (95%CI: 1.34, 1.92) ● L-S-Co HR 1.38 (95%CI: 1.21, 1.57)	Patients with SCIs possess higher risk of DM than non-SCI patients.
Systematic review/Meta-analysis											
Raguindin P.F.	2021	MEDLINE EMBASE Web of Science Cochrane from inception until July 4, 2020	47 studies (N=3,878) Serum glucose 13 studies (N=985) Insulin	-	39.3 (median)	Duration: Chronic Etiology: Not specified Level: -Tetraplegia/ paraplegia - High/low paraplegia	-	Fasting serum glucose (mg/dL) Insulin (uIU/mL) HOMA-IR	Level of Injury	**Mean glucose levels** ● Tetraplegia: 95.9±19.7 ● Paraplegia: 93.4±18.8 (WMD: −0.5, 95%CI: −1.9,1.0, I^2 37.5%) **Mean serum insulin**	No differences in glucose metabolism markers was found.

			6 studies (N=403) HOMA-IR 4 studies (N=214)			Extent: Complete Incomplete					**levels** ● Tetraplegia: 9.8±5.4 ● Paraplegia: 8.9±4.2 (WMD: −0.3, 95%CI: -1.8, 1.1, I^2 81.6%) Pooled differences between the groups was not statistically significant	
Gorden	2021	USA	30 studies (total)	12 studies	-	Duration: Different by studies Etiology: Different by studies Level: Different by studies Extent: Different by studies	-	Literature review	-		**DM prevalence** Different by studies	Reviewed current literature on the prevalence and likely mechanisms driving insulin resistance and T2DM among patients with SCI. Explored the various assessments and diagnostic criteria used for insulin resistance and T2DM and discussed the effects of exercise and/or diet to mitigate disorders of carbohydrate metabolism brought on by neurogenic obesity.

SCI, spinal cord injury; AIS, ASIA Impairment Scale; ICD-9-CM, International Classification of Disease, 9th Revision, Clinical Modification; CDC BRFSS, Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System; SCD-HCQ, Spinal Cord Dysfunction Health Care; LEF, lower extremity fracture; ISS, injury severity score; HOMA-IR, homeostatic model assessment for insulin resistance; DM, diabetes mellitus; T2DM, type 2 diabetes mellitus; HTN, hypertension; BMI, body mass index; CCI, Charlson comorbidity index; SD, standard deviation; CI, confidence interval; OR, odd ratio; HR, hazard ratio; WMD, weighted mean difference.

Supplementary Table S2. Definitions of the degree of severity in dysfunctions of the upper extremities

Grade		Definitions
Level	Number	
1	1	Complete paralysis of both arms (manual muscle strength grade* 0, 1)
2	1	Complete paralysis of one arm (grade 0, 1)
	2	Minimal movement with both nearly paralyzed arms (grade 2)
	3	Complete paralysis of all fingers of both hands (grade 0, 1)
3	1	Paralysis of both arms, which are moderately mobile but not functional (grade 3)
	2	Complete paralysis of the thumb and 2nd finger of both hands (grade 0, 1)
	3	Complete paralysis of all fingers of one hand (grade 0, 1)
	4	Minimal movement with one paralyzed arm (grade 2)
4	1	Complete paralysis of the thumbs of both hands (grade 0, 1)
	2	Complete paralysis of the thumb and 2nd finger of one hand (grade 0, 1)
	3	Complete paralysis of three fingers of one hand, including the thumb or 2nd finger (grade 0, 1)
	4	Paralysis of four fingers of one hand including the thumb or 2nd finger, which are moderately mobile but not functional (grade 3)
5	1	Paralysis of one arm, which is moderately mobile but not functional (grade 3)
	2	Paralysis of the thumbs of both hands, which are moderately mobile but not functional (grade 3)
	3	Complete paralysis of the thumb of one hand (grade 0, 1)
	4	Paralysis of the thumb and 2nd finger of one hand, which are moderately mobile but not functional (grade 3)
	5	Paralysis of three fingers of one hand including the thumb or 2nd finger, which are moderately mobile but not functional (grade 3)
6	1	Paralysis of the thumb of one hand, which is moderately mobile but not functional (grade 3)
	2	Complete paralysis of two fingers of one hand, including the 2nd finger (grade 0, 1)
	3	Paralysis of two fingers of one hand including the thumb, which are moderately mobile but not functional (grade 3)
	4	Complete paralysis of the 3rd, 4th, and 5th fingers of one hand (grade 0, 1)

*Manual muscle strength grade: 5 (normal), complete range of motion against gravity with full resistance; 4 (good), complete range of motion against gravity with some resistance; 3 (fair), complete range of motion against gravity with no resistance; 2 (poor), complete range of motion with gravity eliminated; 1 (trace), evidence of slight contractility with no evidence of joint motion even with gravity eliminated; 0 (zero), no evidence of muscle contractility

Source: Kim M, Jung W, Kim SY, Park JH, Shin DW. The Korea National Disability Registration System. Epidemiol Health. May 11 2023:e2023053. doi:10.4178/epih.e2023053

Supplementary Table 3. Definitions of the degree of severity in dysfunctions of the lower extremities

Grade		Definitions
Level	Number	
1	2	Complete paralysis of both legs (manual muscle strength grade* 0, 1)
2	4	Minimal movement with both nearly paralyzed legs (grade 2)
3	5	Complete paralysis of one leg (grade 0, 1)
4	1	Paralysis of both legs, which are moderately mobile but not functional (grade 3)
	5	Slight movement with one nearly paralyzed leg (grade 2)
5	6	Paralysis of one leg, which is moderately mobile but not functional (grade 3)
5	7	Complete paralysis of all toes of both feet (grade 0, 1)

*Manual muscle strength grade: 5 (normal), complete range of motion against gravity with full resistance; 4 (good), complete range of motion against gravity with some resistance; 3 (fair), complete range of motion against gravity with no resistance; 2 (poor), complete range of motion with gravity eliminated; 1 (trace), evidence of slight contractility with no evidence of joint motion even with gravity eliminated; 0 (zero), no evidence of muscle contractility

Source: Kim M, Jung W, Kim SY, Park JH, Shin DW. The Korea National Disability Registration System. Epidemiol Health. May 11 2023:e2023053. doi:10.4178/epih.e20230