The Association Of Microvascular Complications And Falls In The Population With Diabetes

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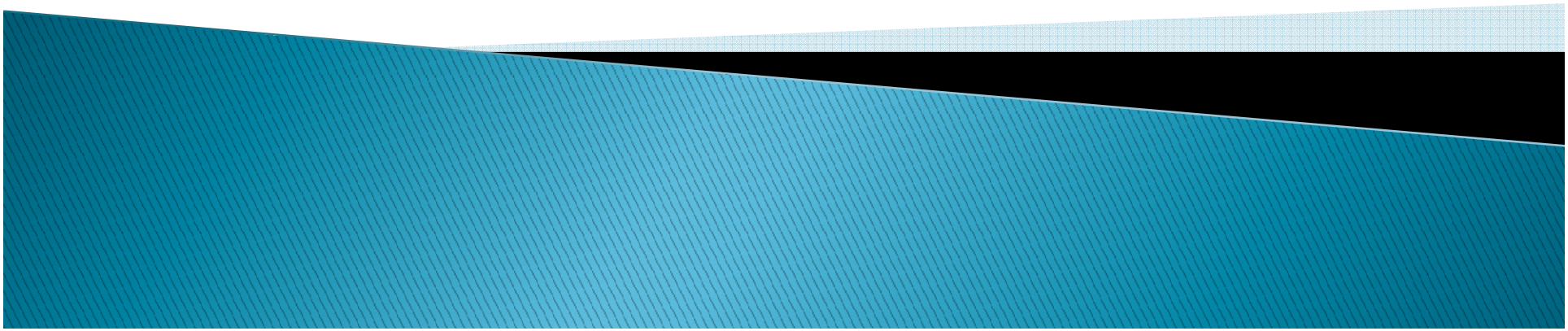
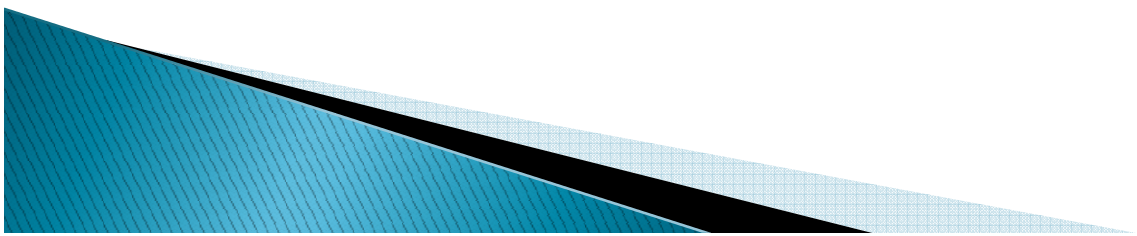


Background

- Microvascular complications of diabetes
  - Diabetic Retinopathy (DR)
  - Diabetic Neuropathy (DNU)
  - Diabetic Nephropathy (DNE)
- DR and DNU may increase risks of physical inability.
- The association of falls with these complications needs further examination.

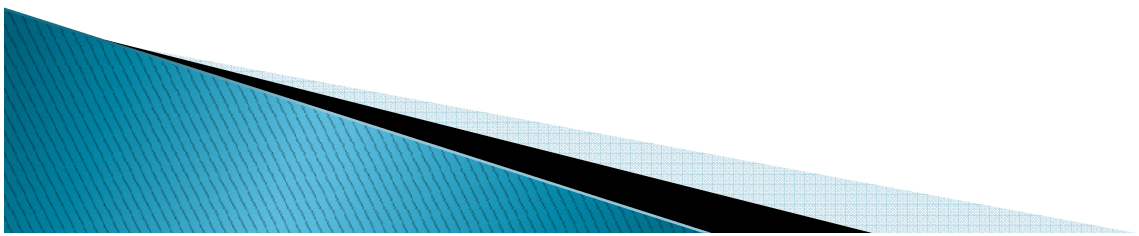


Objectives

- To compare the prevalence of falls among individuals aged 45 years or older with and without diabetes using data from 50 states and territories in the 2006 Behavioral Risk Factor Surveillance System (BRFSS). We also examined DR and DNU as risk factors for falls among population with diabetes.

Methods

- Variable definition
  - Falls were defined as having fallen one or more times during the past 3 months.
  - DR was based on the question “Has a doctor ever told you that diabetes has affected your eyes or that you had retinopathy?”
  - DNU was determined by the question “Have you ever had any sores or irritations on your feet that took more than four weeks to heal?”
  - Type2 diabetes was defined as having diabetes after 30 years of age or having diabetes before 30 but did not use insulin.



Methods (Con.)

- Statistical analysis
  - Age-standardized prevalence of falls was calculated. Logistic regression was used to examine the associations of falls with retinopathy and neuropathy adjusted for demographics (age, race, gender and education), disability and chronic conditions (cardiovascular diseases and obesity) among people with type2 diabetes.
  - SUDAAN was used to account for the complex sample design.

Results

- Among 230385 subjects older than 45 years, the age-standardized prevalence of falls in diabetics and non-diabetics was 21.5% and 15.1%, respectively ($p < 0.05$).
- People with fallen history during the past three months were more likely to be female, white, and obese. They also reported significant higher rate of heart disease, stroke, poor general health, and disability compared to people without this history.

Results (Con.)

- Regarding to diabetes, people with fallen history had longer diabetes duration, earlier diabetes onset, and higher proportion of insulin using. The prevalence of microvascular complications, such as diabetic retinopathy and feet sore, was also higher. All these indicate the people in this group had more severe diabetes.
- Among people with type2 diabetes, retinopathy (odds ratio (OR) =1.37, 95% confidence interval (CI) =1.16–1.61) and neuropathy (OR=1.65 CI=1.34–2.03) were independently associated with falls after adjusting for all covariates.

The prevalence of falls by diabetes status and age group among adults aged 45 years and older, BRFSS, 2006

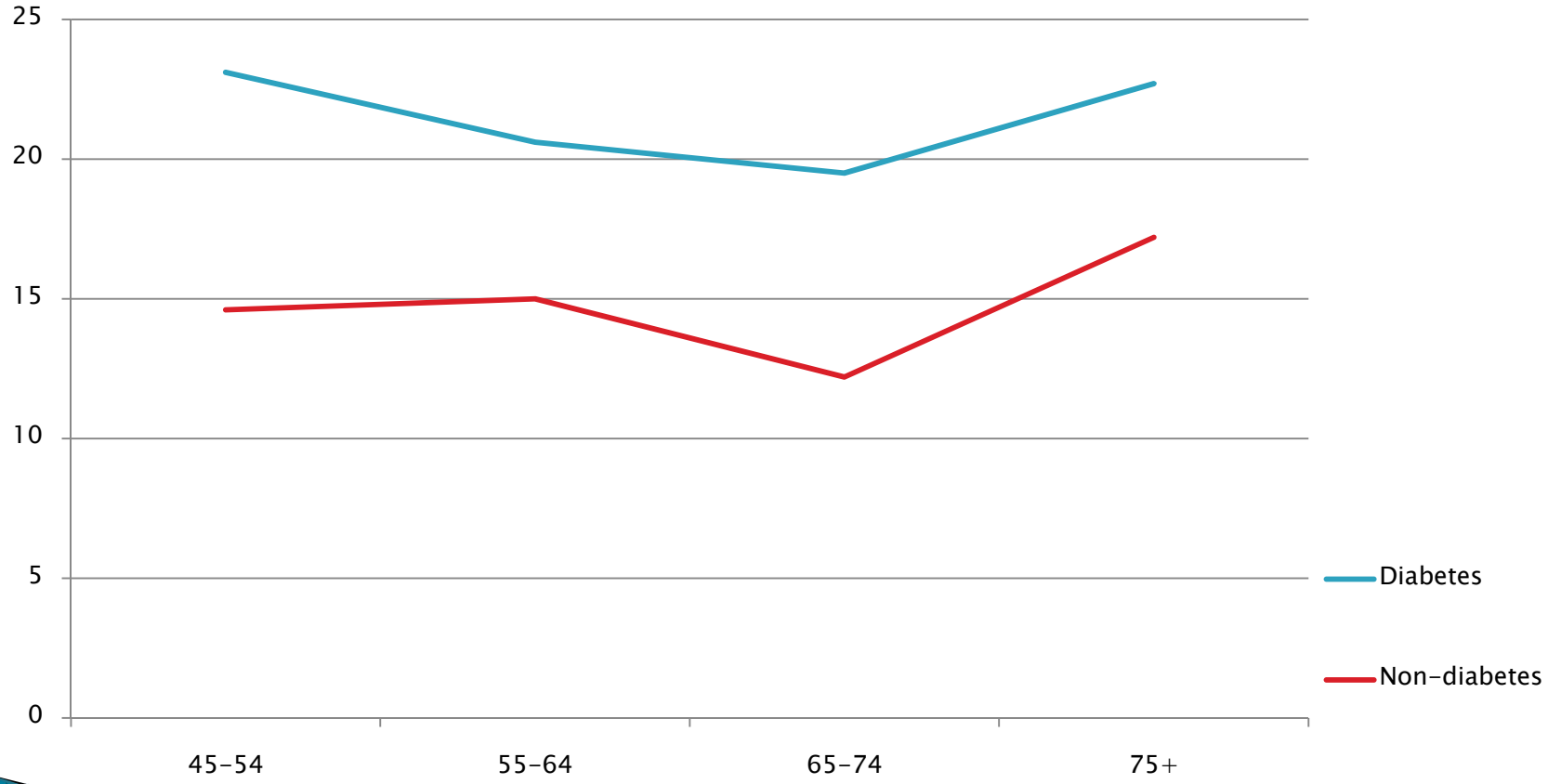


Table1. Characteristics of the Fall and Non-fall groups among people aged 45 years and older with type2 diabetes, BRFSS, 2006

	Falls (N=5,907)	Non-falls (N=20,050)	P value
Age			0.07
45-54	25.2 (1.2)	22.2 (0.7)	
55-64	29.9 (1.3)	31.9 (0.7)	
65+	44.9 (1.3)	46.0 (0.8)	
Sex			<0.001
Male	47.1 (1.4)	52.7 (0.8)	
Female	52.9 (1.4)	47.3 (0.8)	
Race/Ethnicity			<0.001
White	68.9 (1.5)	63.9 (0.8)	
Black	9.8 (0.7)	13.3 (0.5)	
Hispanic	12.9 (1.4)	15.0 (0.8)	
Others	8.4 (0.8)	7.8 (0.5)	
Education			0.27
<High school	21.6 (1.3)	19.4 (0.7)	
High school	32.8 (1.2)	32.7 (0.7)	
>High school	45.2 (1.3)	47.7 (0.8)	
Heart disease	33.6 (1.3)	23.6 (0.7)	<0.001
Stroke	16.7 (1.0)	7.9 (0.4)	<0.001
Obesity status			<0.001
Normal	14.9 (0.8)	15.4 (0.6)	
Overweight	27.2 (1.3)	34.6 (0.8)	
Obesity	57.8 (1.3)	50.0 (0.8)	
Poor/Faire general health	64.5 (1.3)	44.5 (0.8)	<0.001
Disability	69.2 (1.3)	40.9 (0.8)	<0.001
Diabetic retinopathy	26.8 (1.2)	18.8 (0.6)	<0.001
Feet sore	19.0 (1.1)	8.7 (0.5)	<0.001
Diabetes duration			0.02
<10yrs	56.5 (1.3)	59.5 (0.7)	
10-19yrs	28.0 (1.3)	25.9 (0.7)	
20yrs+	15.5 (0.8)	14.6 (0.5)	
Diabetes onset			0.016
<30yrs	1.9 (0.3)	1.4 (0.2)	
30-49yrs	36.1 (1.3)	32.7 (0.8)	
50yrs+	62.0 (1.3)	65.9 (0.8)	
Insulin use	26.6 (1.1)	21.1 (0.6)	<0.001

Table2. Adjusted Odds Ratio (AOR) and 95% Confidence Interval (CI) for the likelihood of falls, DR vs. Non-DR, among people aged 45 years and older with type2 diabetes, BRFSS, 2006

Model	Covariates in the model	AOR	95% C.I.
Model1	age, sex, race/ethnicity	1.72	1.48-2.00
Model2	age, sex, race/ethnicity, heart disease, stroke, obesity, disability, general health	1.39	1.19-1.64
Model3	age, sex, race/ethnicity, heart disease, stroke, obesity, disability, general health, diabetes onset, diabetes duration, insulin intake	1.42	1.20-1.67

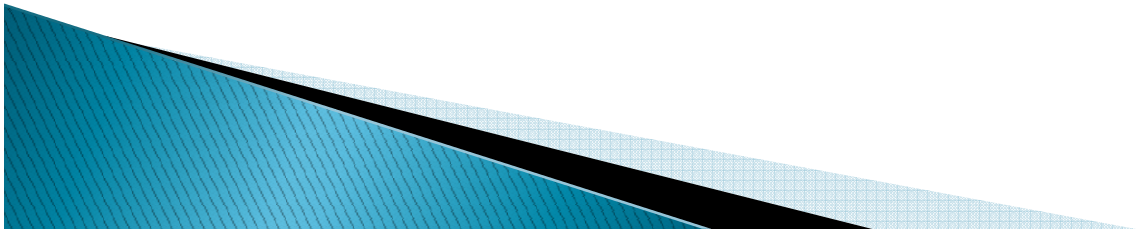


Table3. Adjusted Odds Ratio (AOR) and 95% Confidence Interval (CI) for the likelihood of falls, DNU vs. Non-DNU, among people aged 45 years and older with type2 diabetes , BRFSS, 2006

Model	Covariates in the model	AOR	95% C.I.
Model1	age, sex, race/ethnicity	2.45	2.02-2.96
Model2	age, sex, race/ethnicity, heart disease, stroke, obesity, disability, general health	1.70	1.39-2.09
Model3	age, sex, race/ethnicity, heart disease, stroke, obesity, disability, general health, diabetes onset, diabetes duration, insulin intake	1.70	1.38-2.10

Table4. Adjusted Odds Ratio (AOR) and 95% Confidence Interval (CI) for the likelihood of Falls in the full model, among people aged 45 years and older with type2 diabetes , BRFSS, 2006

	AOR	95% C.I.
Diabetic Retinopathy (Yes/No)	1.37	1.16-1.61
Diabetic Neuropathy (Yes/No)	1.65	1.34-2.03
Age		
55-64 vs.45-54	0.77	0.62-0.95
65+ vs. 45-54	0.82	0.65-1.03
Sex (Female/Male)	1.17	1.03-1.33
Race/Ethnicity		
Black/White	0.64	0.54-0.77
Hispanic/White	0.75	0.57-1.00
Others/White	0.92	0.73-1.16
Heart disease (Yes/No)	1.16	1.00-1.35
Stroke (Yes/No)	1.68	1.40-2.01
Obesity status		
Overweight/Normal	0.83	0.68-1.01
Obesity/Normal	1.06	0.89-1.27
General health (Poor/Faire /Good+)	1.51	1.33-1.72
Disability (Yes/No)	2.37	2.04-2.76
Diabetes duration		
10-19yrs/<10yrs	1.02	0.86-1.21
20yrs+/<10yrs	0.81	0.65-1.01
Diabetes onset		
30-49/<30	0.73	0.47-1.13
50+/<30	0.71	0.44-1.15
Insulin intake (Yes/No)	1.01	0.86-1.17

Conclusion

- Diabetic adults had significant higher prevalence of falls than those without diabetes.
- Retinopathy and neuropathy are independently associated with falls among persons with diabetes.
- Retinopathy and neuropathy are stronger predictors for falls than diabetes onset and diabetes duration.

Conclusion (Con.)

- Microvascular complications can have devastating impact on quality of life. Public health action need to take proactively to control microvascular complications to prevent falls in older people with diabetes.