

# Characteristics of People with Diabetic Retinopathy: Opportunities for Intervention

Appathurai Balamurugan MD, MPH

Neha Thakkar MBA

Masil George MD

# Overview

- Diabetic Retinopathy (DR)
- Study objective
- Design & Methods
- Results

# Diabetic Retinopathy (DR)

- DR is a disease that occurs in people with diabetes and is caused by microangiopathy.
- Leading cause of blindness among adults 25 – 74 years of age.
- Persons with DR are 29 times more likely to be blind than non-diabetic persons.

# Diabetic Retinopathy (DR)

- 5.3 million Americans have DR, 52,000 AR have DR (Source: PBA report)
- Occurs in approximately 40% of people with diabetes (Kempen et al. Arch. Ophthal.)
- Vision threatening retinopathy – 8% of people with diabetes.
- \$500 million annually

# Diabetic Retinopathy

- Stages of diabetic retinopathy:

Mild Nonproliferative

Moderate Nonproliferative

Severe Nonproliferative

Proliferative

# Diabetic Retinopathy

Early identification of those 'at risk'

&

treatment could prevent progression and  
serious vision loss

# Diabetic Retinopathy

- Diabetes Control and Complications Trial (DCCT) demonstrated that:
  - Persons with IDDM with no DR at baseline with intensive insulin treatment had a 60% risk reduction in progression of DR compared with persons with conventional insulin treatment.
  - Persons with DR at baseline, intensive insulin treatment was associated with a 54% reduction in progression, a 47% reduction in the incidence of proliferative retinopathy, and a 54% reduction in laser treatment compared with conventional insulin treatment.

# Diabetic Retinopathy

- Clinical trials have shown the efficacy of treatment:
  - Panretinal photocoagulation could reduce the incidence of serious loss of vision in persons with severe proliferative retinopathy by about 50%.
  - Focal photocoagulation could reduce the loss of visual acuity from 20/20 to 20/40 by 50% .

# DR - Risk factors/Epidemiologic determinants

Who are 'at risk'?

- All people with diabetes (Type I & II)
- Duration of diabetes
- Metabolic control
- Hypertension / Hyperlipidemia
- Renal disease
- Smoking
- Pregnancy

# DR - Risk factors/Epidemiologic determinants

## What is known from the literature?

- Wisconsin Epidemiologic study of DR. (Insulin use, Small body mass)
- Katusic et al. (BMI  $\leq 25$  – 40.8% DR, BMI 26-29.9 – 63.4% DR, BMI  $\geq 30$  – 63.6% DR,  $P < 0.05$ )
- Wong et al. (DR is associated with greater waist-hip ratio)
- EURODIAB study. (DR associated with incident CVD)
- Giuffre et al. (duration and type of antidiabetic treatment, duration of alcohol intake)
- Rema et al. (DR was associated with carotid IMT & AI)
- Rema et al. (DR was associated with proteinuria ( $p=0.002$ ))

# Study Objective

- To assess the characteristics (demographic and disease-specific) of people with diabetic retinopathy using Arkansas behavioral risk factor survey data 2000-2004.

# Study design

- BRFSS – Cross sectional study
- 2000-2004 data
- Diabetes module & Demographics section

# BRFSS survey questions

- Diabetes question: Have you ever been told by a doctor that you have diabetes?
- DR question: Has a doctor ever told you that diabetes has affected your eyes or that you had retinopathy?

# Sample size

- Number of people surveyed through the BRFSS survey (2000-04) – 18,112
- Number of people with Diabetes - 1480
- Number of people with DR - 331

# Variables of Interest

- **Outcome variable** – Diabetic retinopathy
- **Covariates** – Demographic (age, sex, race, duration of diabetes, BMI, income, education, current smoker)

&

Disease-specific (insulin use, anti-DM pill use, daily blood glucose monitoring, daily foot examination, professional foot examination, foot ulcers, A1c tests, course to manage diabetes) characteristics.

# Analysis

- Univariate analysis - Frequency
- Bivariate analysis -  $\chi^2$  test
- Multivariate logistic regression – Stepwise and Backward elimination method used.
- Assessed for confounding and effect modification

# Results

- Diabetes Prevalence (BRFSS 00-04) – 7.23%
- Among people with diabetes, 23.35% had diabetic retinopathy.

# Results contd.

Findings from unadjusted bivariate analysis:

- Significantly higher proportion ( $p=0.0009$ ) of blacks (31.94%) had DR compared to whites (20.94%)
- People with diabetes for over 10 years (36.11%) had significantly higher DR compared to those with < 5 years (14.43%) ( $p<0.0001$ )
- Similarly people who monitored their blood glucose daily (28.27%), used insulin (43.90%), had a professional foot examination (28.34%), have chronic foot ulcers (41.97%), and took a course to manage diabetes (27.71%) had significantly higher DR ( $P<0.005$ )

# Salient findings

After adjusting for the covariates:

- Males (OR=1.60, 95% CI 1.16, 2.19)
- Blacks (OR=1.95, 95% CI 1.27, 3.00)
- People with diabetes for more than 10 years (OR=2.36, 95% CI 1.61, 3.47)
- People on insulin treatment (OR=2.72, 95% CI 1.91, 3.88)
- People with diabetes who have foot sores (OR=2.17, 95% CI 1.46, 3.22)

were more likely to have been diagnosed with diabetic retinopathy.

# Study limitations

- Cause-and-effect: Cross sectional study
- Self-reported data
- Only those diagnosed were counted as cases (DM or DR)

# Implications

- A better understanding of the characteristics of people with diabetic retinopathy may help us in early identification of those 'at risk' and promote preventive care measures.
- Fostering the preventive services and collaboration between eye care providers and podiatrists will assist in identifying people with DR early, and to prevent vision-threatening complications.
- Further, exploring the clinical course of DR and foot ulcers will help us with a better understanding of these frequently encountered complications among diabetics.