

Risk Factors Associated with Noncompliance of Recommended Eye Exams for Diabetic Patients

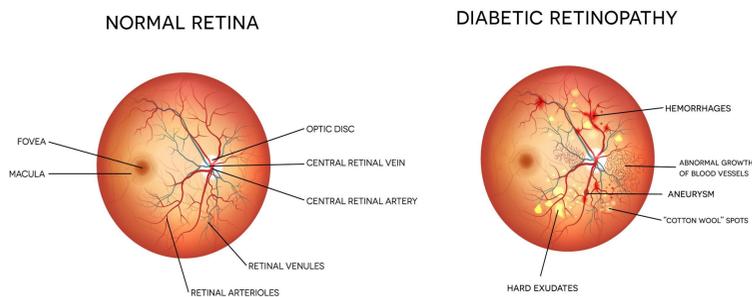
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Abstract

Diabetes mellitus can cause diabetic retinopathy (DR). DR is an eye disease that is the leading cause of preventable vision loss or blindness. Patient compliance can help reduce the risk for getting DR and the complications associated with it. In many studies' patient compliance is defined by follow-up examinations and treatments recommended by the optometrist or ophthalmologist. Different risk factors for non-compliance have been looked at in many studies, such as age, gender, occupation, and traveling distance. In comparing these studies and analyzing the data, distance to travel and lack of diabetes knowledge were the most significant risk factors. The research is important because DR is the leading cause of preventable blindness. Physicians can implement clinical changes to help ease these burdens with transportations options and more patient education. More studies such as a quality improvement study may be warranted.

Introduction



Diabetes Mellitus (DM) is a disease that causes high blood sugar. People with diabetes are unable to make enough insulin or cannot effectively use the insulin it does make. There are 34.2 million Americans with DM, just over 1 in 10 adults having diabetes. (Lee et al. 2014), the number of people with DM in the US has increased by 75% in the last 20 years. There are many medical complications that are associated with DM, some of these complications are kidney disease, foot disease, and DR. More than 2 in 5 Americans with diabetes have some stage of DR.

DR is a serious eye condition that can cause vision loss and blindness in people. It is the leading cause of preventable blindness worldwide. In later stages of the disease, blood vessels in the retina start to bleed into the vitreous. The bleeding can cause floating spots or streaks in your vision. Sometimes, the spots clear up on their own but it's important to get treatment right away. Without treatment, the bleeding can happen again, get worse, or cause scarring (Shah, et. al 2011).

DR is detected by a dilated eye exam, during the recommended eye exam (REE). DR may not have any symptoms at first but finding it early can help you take steps to protect your vision. Patient compliance is essential in managing the risk of vision loss. Compliance starts with a comprehensive dilated eye exam at least once a year. Treatment can be done via injections, lasers, or surgery.

Treatment for DR will not undo the damage but can stop your vision from getting worse. The simplest way to prevent vision loss or damage due to DR is compliance. The disease can be caught at onset before these invasive treatments are necessary.

Problem Statement

What risk factors are associated with DM patient's non-compliance with the recommended eye exam (REE)?

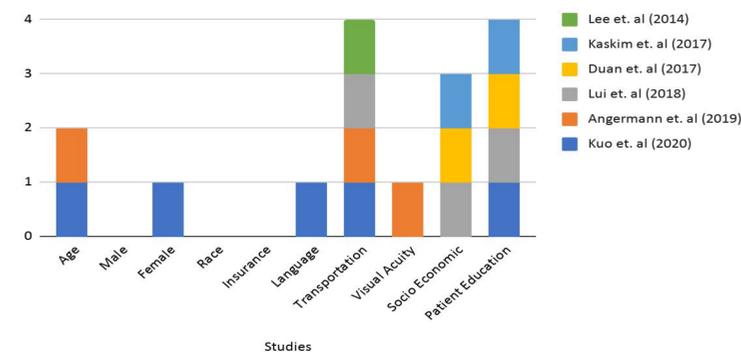
Methods

- What risk factors affect patient non-compliance of recommended eye exams?
- Research peer reviewed journal articles:
 - Pubmed
 - Primo
 - Google Scholar
- Topics searched
 - Diabetic patients
 - Diabetic retinopathy
 - Risk factors for noncompliance:
- Organize the information
- Identify risk factors
- Data entry
- Forest plot performed

Results

- 6 Studies
 - 3 Studies in the United States
 - 1 United Kingdom, German, and China study
- Sample sizes varied from 16-974
- Study types
 - Retrospective
 - Semi structured interviews
 - Meta-analysis
- Risk factors identified **Figure 1.**

Figure 1. Common Risk Factors Identified



- 3 main factors
 - Socio-economic deprivation
 - Distance/transportation
 - Patient education

Table 1. Age

Study or Subgroup	Non Compliant Events	Compliant Total	Compliant Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Angermann, et al. 2019 (F)	26	79	122	344	7.5%	0.93 [0.66, 1.31]
Angermann, et al. 2019 (M)	53	79	222	344	19.9%	1.04 [0.87, 1.24]
Kuo, et al. 2020 (F)	566	974	212	330	32.2%	0.90 [0.82, 0.99]
Kuo, et al. 2020 (M)	409	974	118	330	21.4%	1.17 [1.00, 1.38]
Lee, et al. 2014 (F)	74	138	33	62	10.5%	1.01 [0.76, 1.33]
Lee et al. 2014 (M)	63	138	29	62	8.5%	0.98 [0.71, 1.35]
Total (95% CI)		2382	1472	100.0%		1.00 [0.90, 1.11]
Total events	1190		736			
Heterogeneity: Tau ² = 0.01; Chi ² = 8.42, df = 5 (P = 0.13); I ² = 41%						
Test for overall effect: Z = -0.04 (P = 0.96)						

- Forest plots done on 2 risk factors
 - **Table 1.** Age- a significant increase in non-compliance found patients 70 and older.
 - **Table 2.** Sex- no significant difference in compliance noted
- Unable to compare other risk factors identified
 - Lack of raw data
 - Different criterions set

Table 2. Sex

Study or Subgroup	Non Compliant Events	Compliant Total	Compliant Events	Total	Weight	Risk Difference M-H, Random, 95% CI
Angerman et al. 2019 greater than 70	50	79	169	344	24.4%	0.14 [0.02, 0.26]
Angermann, et al. 2019 less than 70	29	79	175	344	24.4%	-0.14 [-0.26, -0.02]
Angermann 2019	0	79	0	344	0.0%	0.00 [-0.02, 0.02]
Duan 2017	0	27	0	0		Not estimable
Kaskin 2017	0	0	0	0		Not estimable
Kuo 2020 (1)	56	974	58	330	27.3%	-0.12 [-0.16, -0.07]
Lee 2014	52	138	48	62	23.8%	-0.40 [-0.53, -0.27]
Lui 2018	0	0	0	0		Not estimable
Total (95% CI)		1270	1080	100.0%		-0.13 [-0.29, 0.04]
Total events	187		450			
Heterogeneity: Tau ² = 0.03; Chi ² = 35.92, df = 3 (P < 0.00001); I ² = 92%						
Test for overall effect: Z = 1.48 (P = 0.14)						

Outcomes

(Kuo et. al 2020), DR is an eye disease that is the leading cause of preventable vision loss or blindness globally. Patient compliance can help reduce the risk for getting DR and the complications associated with it. DR may not have any symptoms at first but finding it early can help you take steps to protect your vision.

Two other major risk factors for non-compliance identified were distance to travel/transportation, and diabetic education. Physician's may want to use this information to help in clinic management by providing more transportation options and increasing patient education. Socio-economic deprivation seems to affect patient compliance in all studies in which it was evaluated. Socio-economic deprivation could be looked at in the future as sub-categories, such as limitations to transportation, unpaid sick leave, poor nutrition, anxiety and embarrassment due to poor self-care.

Some strengths to this study were seeing consistent risk factors identified that affect noncompliance. Some limitations with this study were locations, not all studies used the same risk factors to evaluate, raw data not available, and a clear compliance criterion was not consistent in all studies. Narrowing the studies to a specific location or population would be a good strategy for future studies.

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