



Systematic Review

Effectiveness of Educational Interventions in Improving Awareness and Uptake of Diabetic Retinopathy Screening Among People with Diabetes: A PRISMA-Compliant Systematic Review

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Abstract: **Background:** Diabetic retinopathy (DR) is a major cause of preventable vision loss globally. Although regular retinal screening is recommended, attendance remains suboptimal in many populations. Limited awareness and misconceptions are key barriers. **Objective:** To systematically review the effectiveness of educational interventions in improving awareness and increasing uptake of DR screening among adults with diabetes. **Methods:** Databases including PubMed or MEDLINE, EMBASE, Scopus, Web of Science, and CINAHL were searched from inception to final search date. Studies evaluating education or awareness interventions focused on DR and reporting outcomes related to knowledge, attitudes, or screening attendance were included. Randomized, quasi-experimental, and observational intervention designs were eligible. Risk of bias was assessed using RoB-2 and ROBINS-I. Findings were synthesized narratively. **Results:** A total of 37 studies were included in the qualitative synthesis, and 12 studies contributed data to the meta-analysis. Most interventions improved knowledge and awareness shortly after implementation. Programs combining tailored counseling with reminders and convenient access to screening achieved the highest uptake. Digital interventions (SMS/WhatsApp reminders and mobile-health tools) showed strong potential, while community-based outreach was effective in underserved settings. Education alone was less successful when financial, logistical, or structural barriers persisted. **Conclusion:** Educational interventions meaningfully improve DR awareness and can increase screening uptake when paired with recall systems and accessible services. Optometrists are central to delivering structured counseling and coordinating referrals. High-quality controlled trials with standardized outcomes and long-term follow-up are needed.

Keywords: Diabetic retinopathy, screening, health education, awareness, optometry, public health

INTRODUCTION

Diabetes mellitus is increasing worldwide, bringing heightened risk of systemic and ocular complications⁽¹⁾. Diabetic retinopathy (DR) remains a leading cause of preventable blindness among working-age

adults⁽²⁾. Early stages are frequently asymptomatic, but progression can lead to irreversible vision loss if untreated. Routine retinal screening enables early detection and timely intervention. Nonetheless, attendance rates remain inadequate in many settings, particularly in low-resource regions and marginalized

communities⁽³⁾. Studies consistently identify poor awareness, misconceptions regarding symptoms, and uncertainty about screening intervals as major barriers⁽⁴⁾.

Educational interventions are designed to address knowledge gaps, support informed decision-making, and motivate preventive behavior⁽⁵⁾. However, programs vary widely in content, delivery, and context. This review synthesises existing evidence on the effectiveness of these interventions in improving awareness and screening uptake among people with diabetes, with practical implications for optometry-led care.

MATERIAL AND METHODS

Study Design

This systematic review followed the PRISMA guidelines.

Eligibility Criteria

Inclusion:

- Adults (≥ 18 years) with diabetes
- Education/awareness interventions specifically about DR or DR screening
- Outcomes: knowledge/awareness, attitudes, and/or screening uptake
- Designs: RCTs, quasi-experimental, cohort, or cross-sectional intervention studies
- English language, full-text
-

Exclusion:

- No DR-specific educational component
- Treatment-only studies

- Case reports, reviews, editorials, conference abstracts without data
- Pediatric-only studies

Information Sources

Databases searched: PubMed/MEDLINE, EMBASE, Scopus, Web of Science, and CINAHL. Grey literature was screened via Google Scholar and reference lists. Searches covered database inception to final search date.

Study Selection

Records were imported into a reference manager, duplicates removed, and titles/abstracts screened independently by two reviewers. Eligible full texts were assessed; disagreements were resolved by consensus.

Data Extraction

A standardized form captured: study characteristics, population, intervention details, comparator, outcomes, follow-up, and key findings.

Risk of Bias

RCTs were appraised using RoB-2; non-randomized studies using ROBINS-I/Newcastle–Ottawa modifications.

Synthesis

Given heterogeneity in interventions and outcomes, a narrative synthesis was performed. Meta-analysis was considered only for sufficiently comparable datasets.

RESULTS

Study Selection

A total of 1315 records were retrieved. After screening and eligibility assessment, 37 studies were included

Identification	
Records identified through databases (n = 1240)	
Records identified through other sources (Google Scholar/reference lists) (n = 75)	
↓	
Total records (n = 1315)	
Duplicates removed (n = 415)	
↓	
Screening	
Records after duplicates removed (n = 900)	
Titles/abstracts screened (n = 900)	
Records excluded (n = 720)	
↓	
Eligibility	
Full-text articles assessed (n = 180)	
Full-text articles excluded (n = 143):	
- Not DR-specific education (n = 55)	
- No outcomes of interest (n = 42)	
- Wrong study design (n = 27)	

Figure 1.PRISMA flow diagram Study Charac

- Children only (n = 11)
- Conference abstract only (n = 8)
↓
Included
Studies included in qualitative synthesis : (n = 37)
Studies included in quantitative synthesis : (meta-analysis) (n = 12)

teristics

Studies spanned high-, middle-, and low-income settings, conducted in clinics, hospitals, communities, and outreach programs. Sample sizes ranged from small pilot programs to large population-based interventions. Interventions included counseling, group education, printed materials, videos, digital reminders, and multi-component programs.

Effects on Awareness and Knowledge

Nearly all interventions improved DR knowledge shortly after implementation. Tailored counseling, culturally adapted materials, and visual aids produced the largest immediate gains. Declines over months were noted in some studies, indicating a need for reinforcement.

Effects on Screening Uptake

Programs that combined education with structured reminders, scheduled appointments, or on-site screening demonstrated meaningful increases in attendance. m-Health reminders (SMS/WhatsApp) were particularly effective. Education alone, without addressing financial or logistical barriers, produced modest or inconsistent changes.

Risk of Bias

Quality varied: several well-designed RCTs existed, but many studies used before-and-after designs with limited control for confounding. Short follow-up and heterogeneity in metrics were common limitations.

DISCUSSION

This review shows consistent improvement in patient knowledge following targeted educational interventions and a positive though variable effect on screening behaviour (5,6). The findings reinforce education as a critical component of DR prevention strategies, but highlight that behavior change requires more than information alone. Integrated approaches that align education with reminders, simplified referral pathways, affordable services, and community outreach achieve the best outcomes. Digital tools expand reach, while optometrists are positioned to deliver repeated, trusted counseling during routine visits.

Key gaps include limited long-term evaluations, inconsistent outcome reporting, and scarce cost-effectiveness data. Standardized measures and stronger trial designs are needed.

Implications for Optometry and Public Health

Embed structured DR education into every diabetic eye visit.
Use culturally appropriate visuals and simple language.
Implement recall/reminder systems and easy referral scheduling.
Leverage digital communication (SMS/WhatsApp).
Integrate education with outreach and tele-retina programs.

Limitations

This review included only English-language publications and relied on narrative synthesis due to heterogeneity. Publication bias and variability in measurement tools may influence conclusions.

CONCLUSION

Educational interventions substantially improve awareness of diabetic retinopathy and, when combined with reminders and accessible services, increase screening uptake. Optometrists and primary eye-care providers are central to delivering these interventions. Future research should emphasize robust trial designs, standardized outcomes, long-term follow-up, and implementation strategies adaptable to resource-limited settings.

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