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The Impact of Yao-Language Educational Videos on Diabetic Retinopathy Prevention in the Liannan Yao Population

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Abstract

Purpose: To evaluate the efficacy of culturally adapted Yao-language digital videos in improving diabetic retinopathy (DR) prevention and treatment outcomes among the Yao ethnic population in Liannan.

Methods: A randomized controlled trial was conducted with 200 Yao patients with diabetes recruited from Liannan Yao Autonomous County People's Hospital between January and December 2023. Participants were allocated to a control group (n=100, routine health education) or a study group (n=100, routine education plus Yao-language DR prevention videos). Outcomes included DR knowledge, screening adherence, and glycemic control (fasting blood glucose and HbA1c).

Results: The study group exhibited significantly higher DR knowledge scores ($P < 0.05$), a 60% greater active screening rate (88% vs. 55%, $P < 0.05$), and superior glycemic control (higher satisfaction rates for FBG and HbA1c, $P < 0.05$) compared to the control group.

Conclusions: Yao-language educational videos significantly enhanced DR awareness, screening participation, and metabolic outcomes in this underserved population, demonstrating substantial clinical efficacy and warranting broader implementation.

Keywords: Diabetic Retinopathy; Yao Ethnic Group; Health Education; Screening Adherence; Cultural Adaptation

Abbreviations: DR: Diabetic Retinopathy; T2DM: Type 2 Diabetes Mellitus; FBG: Fasting Blood Glucose; VTDR: Vision-Threatening DR

Introduction

The global prevalence of type 2 diabetes mellitus (T2DM) continues to rise, leading to a corresponding increase in diabetic retinopathy (DR)-related blindness and visual impairment [1]. Early DR screening is critical for identifying patients requiring systemic ophthalmic evaluation and treatment, thereby preventing permanent vision loss [2]. In the Liannan Yao Autonomous County, a remote mountainous region of China, geographic isolation and limited healthcare resources contribute to inadequate DR awareness and prevention knowledge among the Yao ethnic population with diabetes. This knowledge gap may lead to neglect of DR prevention and management, exacerbating disease progression risks. Consequently, improving DR education in this population is imperative. Educational videos, as an intuitive and accessible health communication tool, have been widely adopted in health promotion campaigns [3]. Video-based interventions effectively deliver complex medical information in a simplified format, enhancing patient comprehension and retention. However, cultural and linguistic barriers among Yao patients complicate DR education and screening efforts. Therefore, developing culturally and linguistically tailored video interventions for DR education in Yao communities holds urgent practical and clinical significance. This study evaluates the efficacy of Yao-language educational videos in improving DR awareness and prevention among 200 Yao patients with diabetes.

Materials and Methods

Study Population

A total of 200 Yao patients with diabetes who visited Liannan Yao Autonomous County People's Hospital from January 2023 to December 2023 were enrolled.

Inclusion Criteria:

(1) Diagnosis of diabetes mellitus (WHO criteria) [4] and diabetic retinopathy (DR) confirmed by clinical evaluation; [5]

(2) Age ≥18 years;

(3) Written informed consent obtained from both patients and their legal guardians.

Exclusion Criteria:

(1) Severe systemic or organ comorbidities;

(2) Impaired consciousness;

(3) Inability to communicate verbally;

(4) Withdrawal or loss to follow-up;

(5) Poor compliance;

(6) Prior ophthalmic treatment;

(7) Gestational hyperglycaemia;

(8) Terminal illnesses. This study adhered to the Declaration of Helsinki and was approved by the Ethics Committee of Liannan Yao People's Hospital (Approval No. 2023LNRY-002). All participants provided written informed consent.

Development of Educational Videos

The Yao-language educational videos were developed in close alignment with the linguistic and cultural characteristics of the Yao ethnic group to ensure accurate dissemination of diabetic retinopathy (DR) prevention and treatment knowledge. A comprehensive analysis of Yao cultural practices and linguistic patterns was conducted to align the content with both medical accuracy and cultural relevance. Local Yao medical practitioners and cultural experts collaborated in scriptwriting and video production, translating complex medical terminology into culturally resonant language. Traditional Yao narrative styles and cultural elements were incorporated to enhance audience engagement and acceptance.

Group Allocation and Intervention

Participants were randomly assigned to either the control group (n=100) or the study group (n=100) using a random number table method. The control group received routine health education, including verbal instruction on diabetic retinopathy (DR) prevention and treatment supplemented with illustrated pamphlets to reinforce knowledge acquisition, self-care skills, and disease management. The study group received culturally adapted Yao-language educational videos focusing on DR prevention and treatment, in addition to the control group's protocol.

Outcome Measures and Evaluation Criteria Definitions of Active and Passive Screening

(1) Active screening: Defined as patients with diabetes undergoing DR examination at the hospital specifically for proactive ocular health monitoring.

(2) Passive screening: Defined as patients seeking DR examination only after experiencing vision deterioration, referral from endocrinology departments, or healthcare provider notifications. The active screening rate was assessed at the 1-year follow-up.

DR Prevention Knowledge Score

A researcher-developed questionnaire assessing DR prevention and treatment knowledge was administered to both groups. Participants' baseline knowledge was evaluated after hospital admission, with follow-up assessments conducted at 1 year. The questionnaire comprised 20 items with binary responses ("know" or "do not know"). A score of 0 was assigned for "do not know" and 1 for "know," yielding total scores ranging from 0 to 20. Higher scores indicated superior knowledge levels.

Glycaemic Control Satisfaction

Glycaemic control was categorized as follows: Optimal: Fasting blood glucose (FBG) ≤7.0 mmol/L and HbA1c≤7.0%; Suboptimal: FBG 7.1-8.5 mmol/L or HbA1c 7.1-8.0%; Poor: FBG >8.5 mmol/L or HbA1c >8.0%.

Measurement of FBG and HbA1c

Fasting peripheral venous blood samples (5 mL) were collected on the second day after admission and at the 1-year follow-up. Blood was clotted at room temperature for 10-20 minutes, centrifuged at 3,000 rpm for 20 minutes (radius: 15 cm) under 2-8°C, and analysed using a fully automated biochemical analyser (Hitachi 7600) to measure FBG and HbA1c levels.

Statistical Analysis

Statistical Product and Service Solutions (SPSS) 25.0 statistical software was used to analyse the data. The count data were presented with n (%) and the comparison between the two groups was analysed by the $\chi 2$ test, and the measurement data were expressed by mean ± standard deviation and analysed by t-test. $p<0.05$ was considered statistically significant.

Results

Baseline Characteristics

The study group comprised 56 males and 44 females, aged 40-80 years (mean: 58.21 ± 8.41 years), with a diabetes duration of 1-18 years (mean: 9.04 ± 4.34 years). The control group included 45 males and 55 females, aged 42-78 years (mean: 58.33 ± 8.01

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years), with a diabetes duration of 1-17 years (mean: 8.75 ± 4.52 years). Baseline fasting blood glucose (FBG) was 16.15 ± 3.32 mmol/L in the study group and 15.35 ± 3.43 mmol/L in the control group. Baseline HbA1c levels were 13.42 ± 2.92% (study group) and 12.84 ± 3.41% (control group). No statistically significant differences were observed in baseline characteristics between groups (P > 0.05), confirming comparability (Table 1).

Prevention Knowledge Scores

At baseline, both the study and control groups exhibited low prevention knowledge scores, with no statistically significant intergroup difference (P > 0.05; Table 1). Post-intervention, both groups demonstrated significant improvements in scores compared to baseline (P < 0.05; Tables 2). However, the study group achieved markedly higher scores than the control group at follow-up (P < 0.05; Table 3).

Screening Adherence

The study group demonstrated a significantly higher active screening rate compared to the control group (88% vs.55%, χ^2 = 26.721, P < 0.001) (Table 4).

Glycemic Control Outcomes

At baseline, both groups exhibited elevated fasting blood glucose (FBG) and HbA1c levels with no significant intergroup differences (P > 0.05; Table 1). Post-intervention, both groups showed significant reductions in FBG and HbA1c (P < 0.05; Table 2). However, the study group achieved lower FBG (8.09 ± 1.17 vs. 10.77 ± 2.50 mmol/L) and HbA1c (7.69 ± 1.80% vs. 9.92 ± 1.28%) levels compared to the control group (P < 0.05; Table 3).

Glycemic Control Satisfaction

The study group had significantly higher rates of optimal/suboptimal glycaemic control compared to the control group (62% vs. 16%, χ^2 = 45.372, P < 0.001) (Table 5).

Table 1: Baseline Demographic and Clinical Characteristics.

Variable		Study Group (n=100)	Control Group (n=100)	t/χ^2 Value	P-Value
Sex, n (%)	Male	56	45	2.42	0.12
	Female	44	55		
Age (years)		58.21±8.41	58.33±8.01	-0.103	0.918
Disease duration (years)		9.04±4.34	8.75±4.52	0.463	0.644
FBG (mmol/L)		16.15±3.32	15.35±3.43	1.669	0.097
HbA1c (%)				1.296	0.197
Prevention knowledge score		7.98±1.63	7.88±1.65	0.432	0.666

Table 2: Baseline and Post-Intervention Outcomes in the Study and Control Groups.

Variable	Study Group		Control Group		Statistical Comparison		
	Baseline	1-Year	Baseline	1-Year	t-Value (Study)	t-Value (Control)	P-Value
Prevention knowledge score	7.98±1.63	14.21±2.03	7.88±1.65	8.76±1.75	-23.974	-3.658	<0.001
FBG (mmol/L)	16.15±3.32	8.09±1.17	15.35±3.43	10.77±2.50	22.88	10.801	<0.001
HbA1c□%□	13.42±2.92	7.69±1.80	12.84±3.41	9.92±1.28	-10.106	7.987	<0.001

Table 3: Intergroup Comparison at 1-Year Follow-Up.

Variable	Study Group	Control Group	t-Value	P-Value
Prevention knowledge score	14.21±2.03	8.76±1.75	20.339	<0.001
FBG (mmol/L)	8.09±1.17	10.77±2.50	-9.682	<0.001
HbA1c□%□	7.69±1.80	9.92±1.28	-10.106	<0.001

Table 4: Screening Adherence Rates in the Study and Control Groups.

Group	Active Screening, n (%)	Passive Screening, n (%)	χ^2 Value	P-Value
Study	88 (88.0)	12 (12.0)	26.721	<0.001
Control	55 (55.0)	45 (45.0)		

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Table 5: Glycemic Control Satisfaction Categories.

Group	Optimal, n (%)	Suboptimal, n (%)	Poor, n (%)	χ^2 Value	P Value
Study	55 (5.0)	57(57.0)	38(38.0)	45.372	<0.001
Control	0(0.0)	16(16.0)	84(84.0)		

Discussion

Diabetic retinopathy (DR) typically develops 5-7 years after diabetes onset, [6] yet delayed ophthalmic evaluations remain common, particularly since early-stage DR often lacks symptomatic visual impairment [7]. A recent study revealed that 50%-60% of individuals with diabetes in China have never undergone dilated fundus examinations. In Northeast China, 89% of 800 DR patients were previously undiagnosed, with 73.4% of vision-threatening DR (VTDR) cases undetected. Risk factors for underdiagnosis included age >60 years, diabetes duration <10 years, absence of screening

reminders, and preserved visual acuity. Notably, 93.5% of non-VTDR cases were undiagnosed [8,9]. Once advanced DR develops, surgical interventions often fail to restore lost visual function. International guidelines uniformly recommend initiating retinal screening at diabetes diagnosis. For patients without retinopathy (NO-DR), annual screenings are advised, while those with any DR require risk-stratified follow-up (every 3, 6, or 12 months) or referral to specialists based on VTDR progression risk [10]. Screening is pivotal for mitigating DR-related blindness, yet low DR awareness in China underscores the need for targeted education [11]. This study demonstrates that Yao-language videos significantly improved screening adherence, with the intervention group achieving an 88% active screening rate-60% higher than the control group (55%). Additionally, the intervention group had a higher proportion of optimal/suboptimal glycaemic control (62% vs. 16%). These findings validate the utility of culturally adapted videos in activating health-seeking behaviours among the Yao population. By enhancing perceived DR severity and screening benefits, the videos likely strengthened intrinsic motivation for proactive care.

The implementation of Yao-language educational videos significantly enhanced the dissemination of DR prevention knowledge. Post-intervention, the study group demonstrated markedly higher DR knowledge scores compared to the control group ($P < 0.05$), with statistically significant intra-group improvements from baseline. These findings align with prior studies highlighting the efficacy of video-based health education in improving knowledge among diabetic retinopathy patients [12-14]. By leveraging linguistic accessibility and culturally relevant case studies, the Yao-language videos effectively mitigated information loss caused by language barriers and cultural disparities inherent in traditional health education methods. Notably, the study group exhibited significant improvements in fasting blood glucose (8.09 ± 1.17 vs. 16.15 ± 3.32 mmol/L) and HbA1c (7.69 ± 1.80% vs. 13.42 ± 2.92%) levels post-intervention. This suggests that enhanced knowledge may drive better self-management practices-such as medication adherence and dietary control- indirectly improving metabolic parameters and synergistically reducing DR risk.

This study has several limitations warranting further investigation. Despite significant post-intervention metabolic improvements in the study group, only 5% achieved "optimal glycaemic control," highlighting the limited efficacy of educational interventions alone in addressing advanced metabolic dysregulation. Future research should explore integrated approaches combining education with personalized pharmacological regimens. Additionally, the 1-year follow-up period precluded assessment of long-term impacts on DR incidence. Prior studies emphasize that sustained improvements in screening adherence require concurrent lifestyle modifications, [15] while digital screening methods are emerging as viable tools for expanding preventive care access [16]. Notably, the control group exhibited a 24.3% reduction in fasting blood glucose, potentially attributable to risk awareness inherent in routine care, suggesting that standard health education retains intrinsic behavioural intervention value.

In summary, the innovative use of Yao-language educational videos, through culturally adapted interventions, effectively addresses linguistic and cultural barriers in health management for ethnic minorities. This approach demonstrated significant efficacy in DR prevention and treatment among the Yao population, substantially enhancing DR awareness and screening participation. The findings underscore the value of integrating culturally tailored health education into minority healthcare systems, warranting broader implementation.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, Zhou XZ, upon reasonable request.

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