Application Effect of Patient-centered Health Education in Patients with Type 2 Diabetes Accompanied by Hyperlipidemia

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ABSTRACT

Objective • This study aims to investigate the impact of patient-centered health education on individuals with type 2 diabetes coexisting with hyperlipidemia.

Methods • A cohort of 80 patients with type 2 diabetes and hyperlipidemia attending our hospital from February 2022 to August 2022 were randomly assigned to either the health education group or the control group. While the control group received routine health education, the health education group received additional patient-centered health education. Subsequently, we compared blood glucose and lipid levels, negative emotions, quality of life, and the incidence of unhealthy eating or overweight between the two groups post-education.

Results • Following the health education intervention, the health education group exhibited superior improvements in blood glucose and lipid levels compared to the control group. Moreover, there was a significant decrease in SAS and SDS scores and a notable increase in quality of life compared to the control group. The health education group also demonstrated a lower incidence of unhealthy eating or overweight.

Conclusions • Patient-centered health education for individuals with type 2 diabetes and hyperlipidemia proves effective in enhancing glucose and lipid metabolism, mitigating negative emotions, improving quality of life, and reducing unhealthy habits. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

Type 2 diabetes has emerged as an increasingly severe public health concern and achieved a rapid rise in incidence rates in recent years.[1] This condition is characterized by insulin resistance and elevated blood glucose levels, often accompanied by hyperlipidemia.[2] According to statistics, approximately 40% of diabetes patients in China also experience hyperlipidemia.[3] The coexistence of type 2 diabetes and hyperlipidemia not only increases the risk of major cardiovascular events but also poses a threat to patient mortality.[4] Effectively managing individuals with type 2 diabetes and hyperlipidemia holds the potential to significantly reduce complications and optimize long-term health outcomes.[5]

Currently, there are no definitive treatment approaches for diabetes, highlighting the crucial role of health education in the treatment process.[6] Health education activities empower patients to foster autonomy in managing their health. It promotes self-care, enhancing their capacity to control factors that are pivotal in shaping health-related decisions.[7] Diabetes health education primarily emphasizes the importance of maintaining a healthy lifestyle, encompassing aspects such as dietary plans, physical activity, and medication adherence.[8]

Throughout the health education process, the patient's knowledge, attitude, practice, and self-efficacy concerning the disease are elevated, facilitating improved glycemic control.[9] This strategy significantly contributes to alleviating the disease burden on patients and the healthcare system while concurrently enhancing patients' quality of life and clinical outcomes.[10] Furthermore, a healthy lifestyle has proven effective in improving hyperlipidemia.[11]

Various health education approaches exert distinct effects on enhancing patients' lifestyles.[12] Nonetheless, considerable debate persists regarding which educational approach produces optimal outcomes.[13] In recent years, the model of diabetes management has transitioned from a doctor-centered approach to a patient-centered mode.[14] Furthermore, a patient-centered management mode demonstrates a noteworthy impact on enhancing patients' blood lipid levels.[15]

This study addresses the ongoing debate on optimal health education approaches for individuals with type 2 diabetes and hyperlipidemia, providing insights into the effectiveness of a patient-centered approach compared to conventional methods. Its findings may inform future strategies for improving patient outcomes and lifestyle management.

DATA AND METHODS

Study Design

A total of 80 patients with type 2 diabetes accompanied by hyperlipidemia, visiting The Fourth Hospital of Hebei Medical University between February 2022 and August 2022, were selected as research subjects. Patients were assigned unique numbers based on their admission order and randomly divided into the health education group (n=40) and control group (n=40). Informed consent was obtained from all participants, and the study received approval from The Fourth Hospital of Hebei Medical University Medical Ethics Committee. All subjects and their family members were informed and signed the consent form.

Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) Patients diagnosed with type 2 diabetes; (20 Patients diagnosed with hyperlipidemia; (3) Individuals aged 18-80 years, mentally sound, and willing to cooperate with treatment and assessment; (4) Participants with complete clinical data. Exclusion criteria were as follows: (1) Patients with type 1 diabetes; (2) Those with acute complications of diabetes; (3) Individuals with a history of mental illness; (4) Pregnant or lactating women.

Routine Health Education in Control Group

Patients in the control group underwent routine health education, comprising general health education through thematic lectures, posters, and entertainment activities, with the goal of instilling a healthy lifestyle. The educational content encompassed diabetes and hyperlipidemia knowledge, proper dietary habits, exercise therapy, accurate administration of glucose-lowering and lipid-lowering medications, guidance on monitoring blood glucose and lipid levels, and prevention of complications.

Patient-Centered Health Education

In the health education group, patient-centered health education was provided in addition to routine health education. The education team, comprising experienced nurses with at least 6 months of frontline work experience, designed, demonstrated, and implemented a comprehensive health education program, evaluating its effectiveness.

Program Design and Implementation. The health education program was carefully designed, considering patients' specific conditions. Issues such as acquiring self-monitoring skills for blood glucose control and identifying the main limiting factors in self-health intervention were addressed. Strategies like foresight introduction and problem guidance were employed to explain the harmfulness of diabetes accompanied by hyperlipidemia. Patients were guided on daily precautions, and instructions on regular blood glucose and lipid monitoring were provided.

Staff Training. Regular professional training was conducted to strengthen the capabilities of team members. Tailoring to the specific conditions of the patients involved gaining a comprehensive understanding of their preferences, needs, and values. Issues requiring attention in the health education program were identified through group discussions. For instance, topics included how to assist patients in acquiring self-monitoring skills for blood glucose control and recognizing the primary limiting factors in the self-health intervention of diabetes patients.

Tailoring to Patient Needs. A comprehensive understanding of patient preferences, needs, and values guided the customization of the health education program. Strategies were implemented to correct misconceptions, build patient confidence, and facilitate acquiring self-management skills.

Individualized Intervention Plans. Considering physical condition and dietary habits, patients actively participated in developing systematic diabetes and hyperlipidemia health intervention plans, enhancing knowledge and skill acquisition.

Medication and Education Duration. During the three-month health education period, all patients managed blood sugar with insulin or oral hypoglycemic agents and controlled blood lipid levels with orally ingested atorvastatin calcium tablets (Pfizer Pharmaceuticals Ltd.) at a dosage of 10 mg daily.

Education Duration for Both Groups

The health education and control groups received weekly health education sessions over three months.

Outcome Measures

Comparison of Blood Glucose and Lipid Levels. Before and after health education, fasting venous blood samples (3 mL each) were collected from each patient. The analysis included measurements of fasting blood glucose, triglycerides (TG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) levels. Additionally, postprandial blood glucose levels were measured two hours after lunch.

Assessment of Negative Emotions. The levels of negative emotions among patients were evaluated using the Self-rating Anxiety Scale (SAS) and the Self-rating Depression Scale (SDS) before and after health education. A higher score indicates a more severe state of negative emotion.

Evaluation of Quality of Life. Before and after health education, the patient's quality of life was assessed using the Short Form-36 Health Survey (SF-36). A higher score implies a better quality of life.

Monitoring Unhealthy Habits. The occurrence of unhealthy eating habits and overweight was recorded during the health education period and re-evaluated three months post-education.

Table 1. General Characteristics Comparison Between the Two Patient Groups

| Category | Gender | | Age (years) | BMI | Weight (kg) | Duration of Illness (years) |
	Male	Female				
Control Group (n=40)	22	18	53.18±10.33	23.21±2.11	63.82±6.05	4.18±1.13
Health Education Group (n=40)	24	16	54.23±9.58	23.42±2.06	64.17±5.79	4.00±1.06
t/χ^2	0.2046		0.4714	0.4504	0.2643	0.6694
P value	.6510		.6387	.6537	.7922	.5052

Note: Values presented as ($\bar{x} \pm s$) mean ± standard deviation. P values indicate the statistical significance of differences between the Control and Health Education groups.

Figure 1. Demographic Characteristics of Patients in Control and Health Education Groups
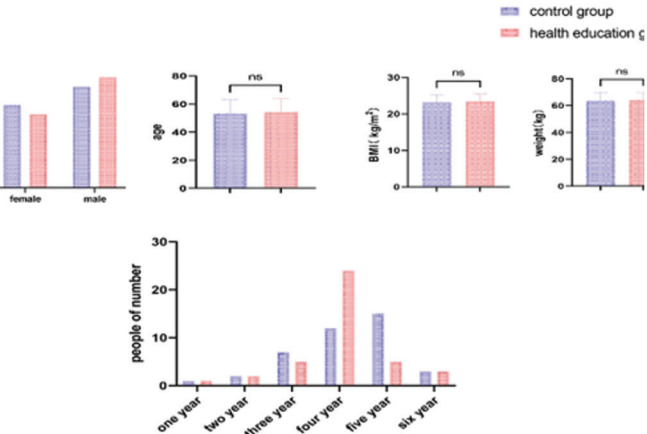
Note: The bar graph illustrates the comparison of demographic characteristics between the control group and the health education group. While the health education group had a higher proportion of male patients compared to the control group, there was no statistically significant difference in gender distribution. No significant differences were observed in age, BMI, weight, or the duration of illness between the two groups. Most patients in both groups had a four-year duration of illness.

Statistical Analysis

Statistical analysis was conducted using SPSS 25.0 software (IBM, Armonk, NY, USA) and GraphPad Prism 9.0 software (San Diego, CA, USA). Continuous variables were presented as mean ± standard deviation ($\bar{x} \pm s$) and compared using the t test. Categorical variables were expressed as [n (%)] and analyzed using the chi-square test (χ^2). A significance level of $P < .05$ was deemed statistically significant.

RESULTS

Comparison of General Characteristics

The comparison between the two patient groups exhibited no statistically significant differences in gender, age, BMI, weight, and duration of illness ($P > .05$). See Table 1 and Figure 1 for details.

Comparison of Blood Glucose and Lipid Levels

The comparison between the two patient groups revealed no statistically significant difference in blood glucose and lipid levels before the intervention ($P > .05$). After the intervention, both groups experienced decreased fasting blood glucose, postprandial 2-hour blood glucose, TG, TC, and LDL-C levels, and increased HDL-C levels ($P < .05$). Furthermore, after the intervention, the health education group exhibited significantly

Table 2. Comparison of Patients' Blood Sugar and Blood Lipid Levels

| Category | Fasting blood sugar (mmol/L) | | Postprandial blood sugar at 2 hours (mmol/L) | | TG (mmol/L) | |
	BI	AI	BI	AI	BI	AI
Control Group (n=40)	7.94±0.36	6.79±0.45[a]	9.93±0.82	8.11±0.72[a]	2.87±0.53	1.82±0.39[a]
Health Education Group (n=40)	7.81±0.43	6.12±0.27[a]	9.88±0.91	7.30±0.84[a]	2.92±0.47	1.51±0.30[a]
t	1.4661	8.0746	0.2582	4.6305	0.4464	3.9847
P value	.1466	<.05	.7970	<.05	.6565	<.05

| Category | TC (mmol/L) | | LDL-C (mmol/L) | | HDL-C (mmol/L) | |
	BI	AI	BI	AI	BI	AI
Control Group (n=40)	6.66±1.22	5.84±0.81[a]	4.96±0.84	3.82±0.44[a]	1.18±0.15	1.45±0.35[a]
Health Education Group (n=40)	6.57±1.07	5.01±0.62[a]	5.05±0.88	3.17±0.28[a]	1.14±0.11	1.66±0.38[a]
t	0.3508	5.1452	0.4679	7.8824	1.3600	2.5708
P value	.7267	<.05	.6412	<.05	.1777	.0120

[a]$P < .05$, indicating statistical significance.

Note: Data are presented as ($\bar{x} \pm s$).

Abbreviations: BI, Before Intervention; AI, After Intervention.

Figure 2. Changes in Blood Sugar and Lipid Levels After Intervention
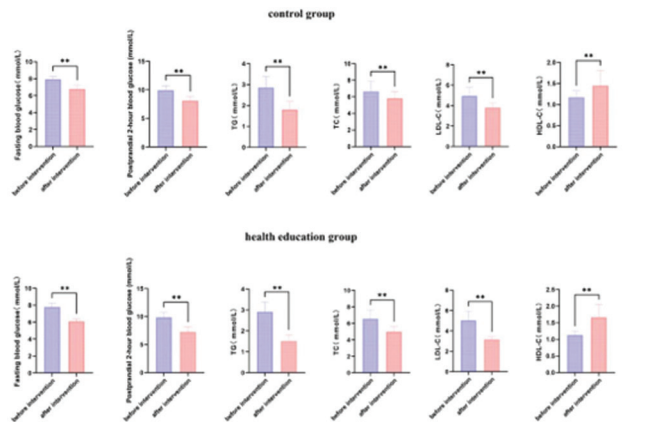
Note: The line graph illustrates the changes in fasting blood sugar, postprandial two-hour blood sugar, triglycerides (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) levels after the intervention in both groups. Statistically significant differences were observed, with a decrease in fasting blood sugar, postprandial two-hour blood sugar, TG, TC, and LDL-C levels, and an increase in HDL-C levels compared to before the intervention.

lower levels of fasting blood glucose, postprandial 2-hour blood glucose, TG, TC, and LDL-C compared to the control group while demonstrating higher HDL-C levels ($P < .05$). See Table 2 and Figure 2 for detailed results.

Comparison of Negative Emotions

Upon comparison, no statistically significant difference ($P > .05$) was observed in the levels of negative emotions between the two patient groups before the intervention. After the intervention, both groups experienced a decrease in the SAS and SDS scores ($P < .05$). Furthermore, post-intervention, the SAS and SDS scores of the patients in the health education group were significantly lower than those in the control group ($P < .05$). See Table 3 and Figure 3 for detailed results.

Table 3. Comparison of Patients' Negative Emotions

Category	SDS Score		SAS Score	
	BI	AI	BI	AI
Control Group (n=40(	50.29±5.07	43.61±4.02[a]	54.79±5.70	45.02±4.41[a]
Health Education Group (n=40)	51.37±5.28	37.14±3.71[a]	55.08±5.85	37.13±3.85[a]
t	0.9331	7.4803	0.2246	8.5241
P value	.3536	<.05	.8229	<.05

[a]$P < .05$, indicating statistical significance. Compared with Before Intervention.

Note: Data are presented as $(\bar{x} \pm s)$.

Abbreviations: BI, Before Intervention; AI, After Intervention. SDS, Self-rating Depression Scale; SAS, Self-rating Anxiety Scale.

Figure 3. Changes in Negative Emotions Scores After Intervention
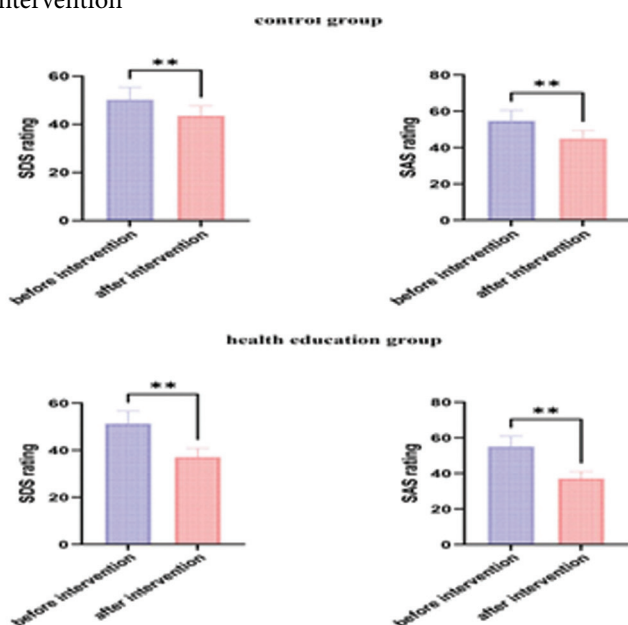
Note: The line graph illustrates the changes in Self-rating Depression Scale (SDS) and Self-rating Anxiety Scale (SAS) scores after the intervention in both groups. Statistically significant differences were observed, with a decrease in SDS and SAS scores in both groups after the intervention compared to before.

Comparison of Quality of Life

Upon comparison, no statistically significant difference in the quality of life was observed between the two patient groups before the intervention ($P > .05$). After the intervention, both patient groups experienced an increase in SF-36 scores ($P < .05$). Furthermore, post-intervention, the SF-36 scores of patients in the health education group were significantly higher than those in the control group ($P < .05$). See Table 4 and Figure 4 for detailed results.

Comparison of Unhealthy Habits

Upon comparison, the incidence of unhealthy eating habits and overweight in the health education group was significantly lower than in the control group ($P < .05$). See Table 5 and Figure 5 for details.

Table 4. Comparison of Patients' Quality of Life

Category	SF-36 Score	
	Before intervention	After intervention
Control Group (n=40)	74.32±3.69	82.27±2.25[a]
Health Education Group (n=40)	75.18±2.81	88.09±2.56[a]
t	1.1727	10.8000
P value	.2445	<.05

[a]$P < .05$, indicating statistical significance. Compared with Before Intervention.

Note: Data are presented as $(\bar{x} \pm s)$.

Abbreviation: SF-36, Short Form-36 Health Survey.

**Figure 4.** Improvement in Quality of Life (SF-36 Scores) After Intervention
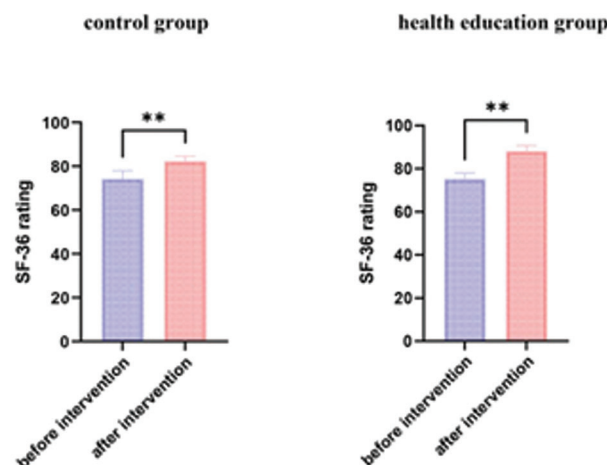
Note: The bar graph depicts the change in Short Form-36 Health Survey (SF-36) scores after the intervention in both groups. Statistically significant differences were observed, with an increase in SF-36 scores in both groups after the intervention compared to before.

Table 5. Comparison of Patients' Unhealthy Lifestyle Habits

Category	Unhealthy Diet	Overweight
Control Group (n=40)	9 (22.50)	8 (20.00)
Health Education Group (n=40)	2 (5.00)	1 (2.50)
x^2	5.1647	4.5070
P value	.0231	.0338

[a]$P < .05$, indicating statistical significance.

Note: Data are presented as [n (%)].

Figure 5. Post-Intervention Comparison of Unhealthy Lifestyle Habits
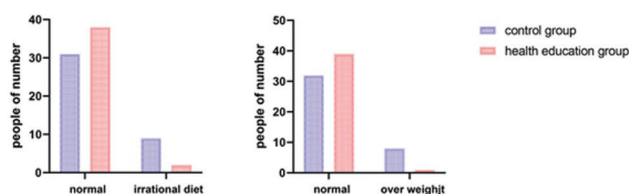
Note: The pie chart represents the prevalence of unhealthy lifestyle habits after the intervention in both groups. While most patients in both groups adopted healthier habits, the control group exhibited more cases of unhealthy diet and overweight compared to the health education group.

DISCUSSION

Type 2 diabetes, a chronic metabolic disease, often presents hyperlipidemia as one of its most prevalent complications.[16] The coexistence of hyperlipidemia substantially increases the risk of cardiovascular events in individuals with diabetes, more than doubling the baseline risk.[17] Health education stands out as a recommended first-line treatment approach for diabetes to enhance lifestyle choices.[18] Recognizing the crucial role of proactive behavioral changes, empowering patients with knowledge about the disease, and fostering self-care behaviors through health education is preferable over-reliance solely on pharmaceutical treatments.[19]

Moreover, effective lipid management holds substantial implications for reducing mortality and cardiovascular risk in individuals with diabetes.[20] The findings of this study highlight the noteworthy impact of patient-centered health management in improving the current situation and unhealthy habits among patients with type 2 diabetes accompanied by hyperlipidemia.

Individuals with type 2 diabetes accompanied by hyperlipidemia face elevated blood glucose levels, elevated cholesterol and triglyceride levels, an increased LDL-C level, and a decreased HDL-C level.[21] Additionally, type 2 diabetes can contribute to negative emotions, including anxiety and depression.[22] The presence of hyperlipidemia not only intensifies these negative emotions but also heightens the risk of schizophrenia in patients.[23] This situation significantly impacts the quality of life of individuals with this disease.[24]

Health education interventions have demonstrated efficacy in managing and controlling the blood glucose levels of individuals with diabetes, effectively mitigating the occurrence and progression of complications.[25] Health education for diabetes patients is predominantly facilitated by healthcare professionals.[24,25] These professionals guide patients through health education and reinforce acquired knowledge through regular follow-ups.[26]

However, existing educational programs often adhere to national or international standards, and there is a recognized need for personalization in diabetes education.[27] The impact of non-personalized education decreases over time.[28] Simultaneously, the scarcity of healthcare professionals capable of delivering high-quality diabetes health education exacerbates this challenge.[29]

The concept of patient-centered care considers the patient's holistic needs and health goals, offering approaches to address these concerns.[30] To a significant extent, achieving patient-centeredness involves understanding the patient's experiences with illness and gaining a comprehensive understanding of the patient as a whole.[31] It involves respecting and responding to the patient's preferences, needs, and values, ensuring that patient values guide all clinical decisions.[32] Research suggests that implementing patient-centered management in health education holds great promise for enhancing patient health outcomes.[33] Additionally, patient-centered healthcare has demonstrated positive results in improving patients' negative emotions.[34]

This study integrated the patient-centered concept into the health education of patients with type 2 diabetes complicated by hyperlipidemia. It highlighted the principle of personalized and comprehensive understanding of patients delivered health education through professional health education personnel. This study revealed that patients receiving patient-centered health education demonstrated significantly improved blood sugar, lipid levels, and negative emotions compared to those receiving regular health education three months post-intervention. Notably, there was a substantial enhancement in the quality of life. Furthermore, the likelihood of developing unhealthy habits significantly decreased after health education. These findings indicate a favorable and impactful application effect of patient-centered health education on patients.

Study Limitations

While the study provides valuable insights into the effectiveness of patient-centered health education for individuals with type 2 diabetes complicated by hyperlipidemia, certain limitations should be acknowledged. Firstly, the study's duration of three months may limit the assessment of long-term outcomes, and extending the follow-up period would offer a more comprehensive understanding of the intervention's sustained effects. Additionally, the study's single-center design may affect the generalizability of findings to diverse patient populations. The reliance on self-reported data for certain parameters, such as lifestyle changes and emotional well-being, introduces the potential for recall bias. Recognizing these limitations enhances the contextual interpretation of the study's outcomes and suggests avenues for future research improvements.

CONCLUSION

In summary, the findings of this study underscore the significant positive impact of patient-centered health education on individuals with type 2 diabetes complicated by hyperlipidemia. The intervention effectively enhanced glucose and lipid metabolism levels mitigated negative emotions, improved overall quality of life, and reduced unhealthy habits. These outcomes highlight the potential of personalized and comprehensive health education strategies in contributing to the holistic well-being of patients, emphasizing the importance of adopting patient-centered approaches in the management of complex metabolic conditions.

AVAILABILITY OF DATA AND MATERIALS
The data supporting the findings of this study are available from the corresponding author upon request, subject to reasonable conditions.

ETHICS APPROVAL AND CONSENT

The present study was approved by the Fourth Hospital of Hebei Medical University (2023/no. 20).

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