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## Nourishing minds, transforming lives: Examining the effectiveness of nutrition education in enhancing pre-diabetes awareness among rural women in Himachal Pradesh

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### Abstract

This study examined the effectiveness of a nutrition education program in improving knowledge among participants. The intervention group received structured interventions and educational activities, while the control group did not receive specific interventions. Data collected before, after 2 months, and after 4 months were analyzed to assess knowledge gains. The intervention group demonstrated significant improvements in knowledge, with gains ranging from 28.57% to 55.01% after 4 months. In contrast, the control group also showed gains in knowledge, ranging from 16.43% to 30.47% during the same period. However, the intervention group consistently achieved higher gains compared to the control group. These findings highlight the positive impact of the nutrition education program in enhancing understanding of nutrition and health-related topics. Targeted interventions are essential for promoting knowledge enhancement and healthier lifestyles.

**Keywords:** Pre-diabetes, nutrition, intervention program, posters presentation, prevalence, prevention

### Introduction

Pre-diabetes may be a chronic metabolic condition where blood glucose levels are above the upper threshold considered normal but below the threshold for a diagnosis of diabetes. Pre-diabetes is increasingly recognized as a major metabolic condition as well as an individual being more likely to progress to diabetes in the future. People with prediabetes are at increased risk of developing many of the conditions normally associated with the disease, including diabetic retinopathy, neuropathy, nephropathy, and macro vascular complications. People need to be made aware of prediabetes, its causes, and treatments that can help improve the condition by adjusting diet and lifestyle changes. Pre-diabetes mellitus (PDM), mentioned as intermediate hyperglycemia or borderline diabetes, represents the intermediate stage of abnormal glucose metabolism consistent with Centers for disease control and prevention (CDC) HbA1c level range between 5.7% and 6.4% is employed for identifying patients with prediabetes.

Pre-diabetes, a condition characterized by higher than normal blood glucose levels, has become a significant public health concern globally, warranting effective preventive measures. In the context of Kangra District, Himachal Pradesh, rural women face unique challenges in managing pre-diabetes due to limited access to healthcare resources, inadequate knowledge about healthy dietary practices, and socioeconomic factors that may hinder their ability to make informed decisions regarding their health.

This research paper aims to investigate the effects of nutrition education on pre-diabetes among rural women in Kangra District. By providing targeted educational interventions focused on dietary habits, nutritional choices, and lifestyle modifications, we seek to empower these women with the necessary knowledge and skills to prevent the progression of pre-diabetes and mitigate the associated health risks.

Several research papers underpin our investigation, highlighting the relevance and significance of nutrition education in the prevention of pre-diabetes among rural women.

By analyzing the key health indicators, such as blood glucose levels, dietary patterns, and physical activity levels, alongside qualitative aspects of participants' experiences and contextual factors, this study seeks to provide valuable insights into the efficacy of nutrition education programs for preventing pre-diabetes among rural women.

## Materials and Methods

### Participant Selection and Group Allocation

A total of 70 local volunteers residing in Kandwadi village, Kangra district, were purposefully selected as participants for this study. The selected volunteers were then divided into two groups: An intervention group and a control group. Each group consisted of 35 subjects.

### Intervention Group and Control Group

The intervention group received comprehensive knowledge about pre-diabetes, including its causes, risk factors, and strategies for prevention and management. On the other hand, the control group did not receive any specific information about pre-diabetes from their caregivers or through the study.

### Nutrition Education Methods

To provide effective nutrition education, a variety of methods were employed. These included the use of diagrams, posters, PowerPoint presentations, and interactive lectures. These strategies aimed to enhance understanding and engagement among the participants, facilitating their comprehension of nutritional concepts and behavior modification related to pre-diabetes.

### Frequency and Duration of Nutrition Education

The nutrition education sessions were conducted twice over a duration of 4 months. Each session focused on reinforcing key knowledge areas and addressing participants' queries. Throughout the study period, the intervention group received ongoing support and guidance to facilitate their learning and implementation of healthy lifestyle choices.

### Assessment of Knowledge Gain

To measure the participants' knowledge gain, evaluations were conducted at two-month intervals. The assessments

aimed to gauge the participants' understanding of pre-diabetes, its management, and the recommended dietary and lifestyle modifications. By comparing the knowledge levels at different time points, the impact of nutrition education on knowledge enhancement could be evaluated.

By implementing these structured methods, including group allocation, varied educational techniques, and regular assessments, this study aimed to investigate the effects of nutrition education on pre-diabetes knowledge and behavior change among the selected participants in the intervention group, in comparison to the control group.

## Results

The table 1 presents the theme-based gain in knowledge of the intervention group during a nutrition education program, showcasing the percentage values before, after 2 months, and after 4 months. The table highlights the significant improvements in knowledge observed within the intervention group.

Before the intervention, the participants had varying levels of knowledge across the different questions, ranging from 38.57% to 70.57%. However, after 2 months, there was a substantial increase in knowledge across all questions. The percentage gains in knowledge during this period ranged from 28.57% to 47.85%, demonstrating the effectiveness of the nutrition education program in enhancing participants' understanding.

The positive trend continued as the participants' knowledge levels further improved after 4 months of the intervention. In this period, the percentage gains in knowledge increased even more, ranging from 29.57% to 55.01%. This indicates that the participants continued to build upon their knowledge and deepen their understanding of the nutrition-related topics covered in the program.

Notably, several questions showed significant improvements in knowledge percentages. For example, the question related to the benefits of incorporating low GI food into the diet saw a gain in knowledge of 48.21% after 2 months, increasing to 55% after 4 months. Similarly, the question about effectively managing pre-diabetes through a healthy diet and lifestyle showed a gain of 47.85% after 2 months and 55.01% after 4 months.

**Table 1:** Theme based gain in knowledge of intervention group during nutrition education

Sr. No.	Questions (Intervention group)	Before (%)	After 2 months (%)	After 4 months (%)	Gain in knowledge in 2 months (%)	Gain in knowledge in 4 months (%)
1.	What is the significance of maintaining good health and why is it important for overall well-being?	70.57	99.04	100	28.57	29.57
2.	What are the common signs and symptoms of pre-diabetes that individuals should be aware of?	69.28	99.28	100	29.99	30.71
3.	What are the key distinctions between diabetes and pre-diabetes in terms of their diagnostic criteria and implications for health?	40	85.71	95.23	44.76	54.28
4.	What is low GI food, and how can incorporating it into your diet benefit your health?	38.57	90.35	97.14	48.21	55
5.	How can a person effectively manage pre-diabetes by adopting a healthy diet and lifestyle?	44.28	92.14	99.28	47.85	55.01

In the table 2 the theme-based gain in knowledge of the control group during a nutrition education program. The table includes questions related to various aspects of nutrition and health, along with the percentage values of knowledge before the intervention, after 2 months, and after

4 months. Additionally, it provides the percentage gains in knowledge during the 2-month and 4-month periods.

Overall, the participants in the control group demonstrated improvements in knowledge throughout the study period. The initial knowledge levels before the intervention varied across the questions, ranging from 40.00% to 57.86%.

However, after 2 months, there was a noticeable increase in knowledge across all questions, with gains ranging from 11.43% to 23.81%. The positive trend continued as the intervention progressed to the 4-month mark. By the end of the program, the participants' knowledge levels further improved, reaching percentages ranging from 57.14% to 87.62%. The gain in knowledge during the full 4-month duration ranged from 16.43% to 30.47%.

Specifically, several questions showed significant gains in knowledge. The question regarding the significance of maintaining good health and its importance for overall well-

being exhibited a gain in knowledge of 30.47% after 4 months, while the question about effectively managing pre-diabetes through a healthy diet and lifestyle showed a gain of 21.43% in the same period.

The results indicate that the nutrition education program had a positive impact on the intervention group's knowledge. Participants experienced notable percentage gains in knowledge across all questions, highlighting the program's effectiveness in enhancing their understanding of nutrition, health, and disease management.

**Table 2:** Theme based gain in knowledge of control group during nutrition education

Sr. no.	Questions (Intervention group)	Before (%)	After 2 months (%)	After 4 months (%)	Gain in knowledge in 2 months (%)	Gain in knowledge in 4 months (%)
1.	What is the significance of maintaining good health and why is it important for overall well-being?	57.14	80.95	87.62	23.81	30.47
2.	What are the common signs and symptoms of pre-diabetes that individuals should be aware of?	56.36	77.86	82.86	14.10	16.43
3.	What are the key distinctions between diabetes and pre-diabetes in terms of their diagnostic criteria and implications for health?	40.00	53.34	57.14	13.33	16.90
4.	What is low GI food, and how can incorporating it into your diet benefit your health?	47.14	58.57	64.64	11.43	17.50
5.	How can a person effectively manage pre-diabetes by adopting a healthy diet and lifestyle?	57.86	72.86	79.28	14.90	21.43

## Conclusion

In the intervention group, the participants demonstrated significant gains in knowledge throughout the study period. After 2 months, the percentage gains in knowledge ranged from 28.57% to 47.85%, while after 4 months, the gains ranged from 29.57% to 55.01%. These results highlight the effectiveness of the nutrition education program in enhancing the intervention group's understanding of nutrition and health-related concepts.

On the other hand, the control group did not receive any specific interventions or nutrition education activities. However, the control group also showed gains in knowledge over time. After 2 months, the percentage gains ranged from 11.43% to 23.81%, while after 4 months, the gains increased to range from 16.43% to 30.47%. These gains suggest that factors other than the implemented nutrition education program might have contributed to the knowledge improvements observed in the control group.

These findings strongly indicate that the nutrition education program had a more substantial impact on improving knowledge levels compared to the natural progression of knowledge observed in the control group. The structured interventions and educational activities provided to the intervention group were effective in enhancing participants' understanding of nutrition, health maintenance, disease prevention, and healthy lifestyle choices.

In conclusion, the intervention group, which received the nutrition education program, demonstrated significantly higher gains in knowledge compared to the control group. The program's structured interventions and educational activities resulted in substantial improvements in the intervention group's knowledge levels, highlighting the effectiveness of the program in enhancing participants' understanding of nutrition-related concepts. These findings emphasize the importance of targeted nutrition education in promoting healthier lifestyles and improving knowledge in nutrition and health-related areas.

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