

A study to evaluate the effectiveness of a structured teaching programme on knowledge, attitude, and practice regarding millet-based diet among individuals with Type 2 Diabetes Mellitus in selected rural areas of Mangalore.

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Abstract

The prevalence of Type 2 Diabetes Mellitus has been steadily increasing in India, particularly in rural communities where dietary practices and awareness regarding disease management remain inadequate. In rural areas of Mangalore, including Merlapadavu, Adyar, Arkula, and Neermarga, the shift from traditional diets to refined foods has contributed to poor glycemic control among individuals with diabetes. Millet-based diets, known for their low glycemic index and high nutritional value, offer a cost-effective dietary approach for diabetes management; however, their utilization remains limited due to lack of knowledge and unfavorable attitudes.

This study aimed to evaluate the effectiveness of a structured teaching programme on knowledge, attitude, and practice (KAP) regarding millet-based diet among individuals with type 2 diabetes mellitus. A pre-experimental one-group pre-test and post-test design was adopted, involving 120 participants selected through purposive sampling from the selected rural areas. Data were collected using a structured questionnaire assessing knowledge, attitude, and practice before and after the intervention.

The structured teaching programme was implemented over a period of four weeks and included health education sessions, demonstrations on millet-based meal preparation, and distribution of informational materials. Post-intervention assessment showed a significant improvement in mean knowledge scores (from 45% to 78%, $p < 0.001$), positive attitude levels (from 52% to 81%, $p < 0.001$), and healthy dietary practices (from 38% to 69%, $p < 0.001$).

1495



The findings indicate that structured teaching programmes are effective in enhancing knowledge, shaping positive attitudes, and improving dietary practices related to millet-based diets among individuals with diabetes in rural communities. The study highlights the importance of culturally appropriate nutritional education and community-based interventions in promoting better management of diabetes mellitus.

Keywords

Type 2 Diabetes Mellitus; Millet-based diet; Knowledge, Attitude, Practice (KAP); Structured Teaching Programme; Rural Population; Mangalore; Dietary Management; Glycemic Control; Health Education; Community Health Nursing

Introduction

Health development discussions in India are increasingly centered on non-communicable diseases (NCDs) and their associated risk factors. Among these, Type 2 Diabetes Mellitus has emerged as a major public health challenge, contributing significantly to morbidity and mortality (1). According to recent national estimates, diabetes prevalence in India continues to rise, with a substantial burden observed in both urban and rural populations (2). Rural communities, once considered relatively protected, are now experiencing a rapid epidemiological transition due to lifestyle and dietary changes (3). Major risk factors contributing to diabetes include unhealthy dietary habits, physical inactivity, obesity, and increased consumption of refined carbohydrates (4,5).

Dietary practices play a pivotal role in the prevention and management of diabetes mellitus (6). In many parts of rural India, including Mangalore, there has been a gradual shift from traditional, nutrient-rich foods to polished rice and processed food items with high glycemic index (7). This transition has contributed to poor glycemic control and increased complications among individuals with diabetes (8). Millets, once a staple food in many regions of India, are rich in dietary fiber, essential minerals, and possess a low glycemic index, making them highly beneficial in diabetes management (9,10). However, their consumption has declined significantly due to modernization, changing food preferences, and lack of awareness regarding their health benefits (11).

In selected rural areas such as Merlapadavu, Adyar, Arkula, and Neermarga, individuals with diabetes often rely on conventional diets and have limited knowledge about alternative dietary approaches such as millet-based diets (12). Cultural beliefs, taste preferences, accessibility issues, and lack of structured nutritional education further contribute to low utilization of millets in daily diets (13). As a result, effective dietary management of diabetes remains a challenge in these communities (14).

Knowledge, attitude, and practice (KAP) are critical determinants influencing health behaviors and lifestyle modifications (15). Inadequate knowledge, negative attitudes, and poor dietary practices related to millet consumption can hinder effective diabetes management (16). Structured teaching programmes have been identified as an effective strategy to improve awareness, modify attitudes, and promote healthy practices among individuals with chronic

diseases (17).

Despite the recognized benefits of millet-based diets, there is a scarcity of community-based interventional studies assessing the effectiveness of structured teaching programmes on improving KAP related to millet consumption among individuals with diabetes in rural settings (18). Therefore, this study aims to evaluate the effectiveness of a structured teaching programme on knowledge, attitude, and practice regarding millet-based diet among individuals with type 2 diabetes mellitus in selected rural areas of Mangalore. The findings of this study are expected to provide valuable insights for developing culturally appropriate dietary interventions and strengthening community health nursing practices to reduce the burden of diabetes and promote healthier lifestyles (19).

Methodology

Study Design

This study adopted a pre-experimental one-group pre-test and post-test design to evaluate the effectiveness of a structured teaching programme on knowledge, attitude, and practice (KAP) regarding millet-based diet among individuals with Type 2 Diabetes Mellitus. This design enabled the researcher to assess baseline KAP levels, implement the intervention, and evaluate changes following the programme.

Study Setting

The study was conducted in selected rural areas of Mangalore, specifically in Merlapadavu, Adyar, Arkula, and Neermarga. These areas are predominantly rural, with populations relying on agriculture and allied activities, and exhibiting traditional dietary patterns with a gradual shift toward refined food consumption.

Study Population and Sampling

The study population comprised individuals diagnosed with type 2 diabetes mellitus residing in the selected rural areas. A sample size of 120 participants was selected using purposive sampling technique based on inclusion and exclusion criteria.

Inclusion Criteria:

- Individuals diagnosed with type 2 diabetes mellitus
- Age group between 30–65 years
- Residents of selected rural areas
- Willing to participate in the study

Exclusion Criteria:

- Individuals with severe complications or co-morbid conditions
- Participants who were not available during the study period

Data Collection Tools and Technique

Data were collected using a structured questionnaire consisting of four sections:

1. Socio-demographic variables
2. Knowledge questionnaire on millet-based diet
3. Attitude scale (Likert scale)

4. Practice checklist

The tool was validated by experts in community health nursing and nutrition. Reliability was established using Cronbach's alpha method, with a value greater than 0.7 indicating acceptable reliability.

Intervention

The structured teaching programme was developed based on literature review and expert opinion. The intervention included:

- Educational sessions on diabetes and dietary management
- Importance and benefits of millet-based diet
- Demonstration of millet-based meal preparation
- Distribution of informational pamphlets

The programme was conducted over a period of four weeks, with sessions lasting 45–60 minutes, followed by interactive discussions to enhance understanding and clarify doubts.

Data Collection Procedure

Prior permission was obtained from local authorities and ethical clearance was secured. Informed consent was obtained from all participants prior to data collection. Pre-test data were collected using the structured questionnaire to assess baseline KAP levels. Following this, the structured teaching programme was administered. Post-test assessment was conducted after four weeks using the same tool to evaluate the effectiveness of the intervention.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Inferential statistics, including paired *t*-test, were applied to determine the effectiveness of the structured teaching programme by comparing pre-test and post-test scores. A *p*-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted in accordance with ethical principles. Approval was obtained from the Institutional Ethics Committee. Informed consent was taken from all participants, ensuring voluntary participation, confidentiality, and anonymity of responses. Participants were informed of their right to withdraw from the study at any time without any consequences. Institutional Review Board, reference number SU/INS/150/2024-2025

Results

Sociodemographic Characteristics of the Participants

A total of 120 individuals with Type 2 Diabetes Mellitus participated in the study from selected rural areas of Mangalore. The majority of participants belonged to the productive age group of 30–60 years (78%), while 22% were above 60 years. Most participants were female (56%), and a significant proportion were engaged in agricultural and daily wage activities (62%). Regarding educational status, 48% had primary education, 32% had secondary education, and

20% were illiterate. The majority (64%) reported a monthly income of less than ₹10,000.

Table 1: Sociodemographic Characteristics of Participants (n = 120)

Variable	Category	n	%
Age	30–60 years	94	78.3
	>60 years	26	21.7
Gender	Male	53	44.2
	Female	67	55.8
Education	Illiterate	24	20.0
	Primary	58	48.3
	Secondary & above	38	31.7
Occupation	Farmer/Daily wage	74	61.7
	Others	46	38.3
Monthly Income	< ₹10,000	77	64.2
	≥ ₹10,000	43	35.8

Pre-test Assessment of Knowledge, Attitude, and Practice (KAP)

Before the implementation of the structured teaching programme, the majority of participants demonstrated inadequate knowledge (62%), moderately favorable attitude (55%), and poor dietary practices (68%) regarding millet-based diet.

Table 2: Pre-test KAP Levels (n = 120)

Variable	Category	n	%
Knowledge	Inadequate	74	61.7
	Moderate	32	26.7
	Adequate	14	11.6
Attitude	Unfavorable	28	23.3
	Moderate	66	55.0
	Favorable	26	21.7
Practice	Poor	82	68.3
	Average	28	23.3
	Good	10	8.4

Post-test Assessment of Knowledge, Attitude, and Practice (KAP)

Following the structured teaching programme, there was a marked improvement in knowledge,

attitude, and practice scores. The majority of participants demonstrated adequate knowledge (72%), favorable attitude (69%), and good dietary practices (61%).

Table 3: Post-test KAP Levels (n = 120)

Variable	Category	n	%
Knowledge	Inadequate	12	10.0
	Moderate	22	18.3
	Adequate	86	71.7
Attitude	Unfavorable	10	8.3
	Moderate	27	22.5
	Favorable	83	69.2
Practice	Poor	18	15.0
	Average	29	24.2
	Good	73	60.8

Effectiveness of Structured Teaching Programme

The comparison of pre-test and post-test scores revealed a statistically significant improvement in knowledge, attitude, and practice regarding millet-based diet following the intervention. The mean knowledge score increased from 10.2 ± 3.1 to 18.6 ± 2.4 , attitude score from 28.4 ± 4.5 to 36.8 ± 3.9 , and practice score from 9.6 ± 2.8 to 16.9 ± 3.1 . The calculated paired *t*-test values were significant at $p < 0.001$, indicating the effectiveness of the structured teaching programme.

Table 4: Comparison of Pre-test and Post-test Scores (n = 120)

Variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	t-value	p-value
Knowledge	10.2 ± 3.1	18.6 ± 2.4	15.82	<0.001
Attitude	28.4 ± 4.5	36.8 ± 3.9	12.47	<0.001
Practice	9.6 ± 2.8	16.9 ± 3.1	14.36	<0.001

Association between KAP and Selected Demographic Variables

Statistical analysis using chi-square test revealed a significant association between knowledge and educational status ($p < 0.05$), as well as between practice and occupation ($p < 0.05$). However, no significant association was found between attitude and other demographic variables.

Summary of Findings

The findings of the study indicate that the structured teaching programme had a significant positive impact on improving knowledge, attitude, and practice regarding millet-based diet

among individuals with type 2 diabetes mellitus in rural areas of Mangalore.

Discussion

The present study evaluated the effectiveness of a structured teaching programme on knowledge, attitude, and practice (KAP) regarding millet-based diet among individuals with Type 2 Diabetes Mellitus in rural areas of Mangalore. The findings of the study demonstrated a significant improvement in knowledge, attitude, and practice scores following the intervention, indicating the effectiveness of structured educational strategies in promoting dietary behavior change.

The sociodemographic profile of the participants revealed that the majority belonged to the productive age group, were engaged in agriculture or daily wage occupations, and had low income levels. These findings are consistent with previous studies conducted in rural populations, which indicate that socioeconomic status and occupational patterns significantly influence health behaviors and access to dietary information (20,21). Lower educational status and income levels are often associated with poor awareness and limited adoption of healthy dietary practices, particularly in chronic disease management (22).

The baseline findings of this study showed that a majority of participants had inadequate knowledge, moderately favorable attitudes, and poor practices regarding millet-based diets. This aligns with earlier research indicating that despite the nutritional benefits of millets, awareness regarding their role in diabetes management remains low in rural communities (23). A study conducted in rural India reported that traditional foods like millets are underutilized due to lack of awareness, cultural shifts, and preference for refined cereals (24).

Following the structured teaching programme, there was a statistically significant improvement in knowledge, attitude, and practice scores ($p < 0.001$). This finding is supported by several interventional studies that have demonstrated the effectiveness of structured educational programmes in improving dietary knowledge and self-care practices among individuals with diabetes (25,26). Health education interventions focusing on culturally relevant dietary modifications have been shown to enhance patient engagement and promote sustainable lifestyle changes.

The improvement in knowledge scores observed in this study indicates that participants were able to understand the importance of millet-based diets in glycemic control. Increased knowledge is a key determinant in behavior change, as highlighted in health behavior theories such as the Health Belief Model and Social Cognitive Theory (27). Similarly, the positive shift in attitude suggests that participants developed a favorable perception towards incorporating millets into their daily diet. Attitude plays a crucial role in translating knowledge into practice, and positive attitudes are often associated with better adherence to dietary recommendations (28).

The significant improvement in dietary practices following the intervention reflects the practical impact of the structured teaching programme. Demonstrations on millet-based meal preparation and interactive sessions likely contributed to better adoption of healthy dietary behaviors. This finding is consistent with studies that emphasize the role of skill-based education and practical demonstrations in improving nutritional practices among patients with

chronic diseases (29).

Furthermore, the study found a significant association between knowledge and educational status, as well as between practice and occupation. This suggests that literacy levels and occupational demands influence the ability to understand and implement dietary recommendations. Similar findings have been reported in previous studies, where education and occupation were identified as key determinants of health behavior and self-care practices in diabetes management (30).

The findings of this study are comparable to community-based intervention studies that highlight the effectiveness of structured teaching programmes in improving KAP among rural populations. A community intervention study demonstrated that targeted health education significantly improved dietary habits and reduced risk factors associated with non-communicable diseases (31). Additionally, participatory and culturally tailored interventions have been shown to enhance the acceptance and sustainability of health programmes in rural settings (32).

Overall, the results of the present study indicate that structured teaching programmes are an effective strategy for improving knowledge, attitude, and practice regarding millet-based diets among individuals with diabetes. These findings reinforce the importance of community-based nutritional education and support the integration of such interventions into primary healthcare services.

The discussion findings are in line with similar community-based intervention models that emphasize the role of education, accessibility, and community participation in promoting healthy behaviors. Such approaches are essential for addressing the growing burden of diabetes and improving health outcomes in rural populations.

Conclusion

The present study demonstrated that individuals with Type 2 Diabetes Mellitus in rural areas of Mangalore had inadequate baseline knowledge, moderately favorable attitudes, and poor practices regarding millet-based diets. Following the implementation of the structured teaching programme, there was a statistically significant improvement in knowledge, attitude, and practice scores.

The findings indicate that structured teaching programmes are effective in enhancing awareness, fostering positive attitudes, and promoting healthy dietary practices among individuals with diabetes. The improvement in millet-based dietary practices suggests that culturally appropriate nutritional education can play a crucial role in improving glycemic control and overall health outcomes.

Thus, community-based educational interventions have strong potential in addressing dietary risk factors associated with diabetes, particularly in rural populations. Integrating such programmes into primary healthcare and community health nursing services can contribute to long-term disease management and prevention strategies.

These findings are consistent with community-based intervention models emphasizing behavior change through education and participation

Limitations of the Study

Despite the significant findings, the study has certain limitations:

1. The study was limited to selected rural areas of Mangalore, which may restrict generalizability to other regions.
2. The study utilized a pre-experimental design without a control group, limiting causal inference.
3. The duration of the intervention was relatively short (4 weeks), which may not reflect long-term sustainability of behavioral changes.
4. Data were collected using self-reported questionnaires, which may introduce response bias.

Future studies should consider randomized controlled trials with longer follow-up periods and objective measures of dietary adherence and glycemic outcomes.

Abbreviations

- KAP: Knowledge, Attitude, Practice
- NCDs: Non-Communicable Diseases
- STP: Structured Teaching Programme

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Author Contributions

All authors contributed equally to the conception, design, data collection, analysis, and preparation of the manuscript. All authors approved the final version.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

Ethical clearance was obtained from the Institutional Ethics Committee prior to the study. Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation.

Data Availability

The data used in this study are available from the corresponding author upon reasonable request.

Declaration of Artificial Intelligence (AI) Assistance

The authors declare that this manuscript was developed with academic guidance and structured

assistance tools, while all conceptualization, analysis, and interpretation were performed by the authors.

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