Implementation of Early Education Using the Mbolo Weki Method as a Policy Support for Early Detection of DM in the Community

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Abstract: The application of the Mbolo Weki method in early education has significant potential in supporting early detection of Diabetes Mellitus (DM) in the community. This study used a quasi-experimental method in Bima Regency, West Nusa Tenggara, on a population at risk of diabetes mellitus. The study subjects consisted of 120 individuals aged 30 years and above who were selected through a cluster random sampling technique. Data collection instruments included a questionnaire and a digital blood sugar monitor, as well as a community participation observation sheet. Data were analyzed using descriptive tests, normality tests, paired t-tests, and chi-square tests to assess differences and relationships between variables. The results showed that the increase in blood sugar checking behavior was also significant, with the intervention group showing an increase from 20% to 72%, while the control group only experienced an increase from 18% to 30%. The significant reduction in participants with blood sugar values $\geq$ 200 mg/dl in the intervention group (from 25% to 13%) compared to the control group (from 23.30% to 21.7%) further strengthens the effectiveness of this method. Statistical analysis using the t-test and chi-square test showed a p-value < 0.001, indicating a significant relationship between the education received and behavior change.

Keywords: Community intervention; Diabetes mellitus; Early detection; Early education; Mbolo weki

Introduction

An important intersection of development principles, community engagement, and health education is highlighted by the use of the Mbolo Weki method in early education to support early diabetes detection. It is well acknowledged that early education is a crucial time for acquiring health knowledge and healthy habits that might avert future health problems, such as diabetes. The Mbolo Weki method represents an innovative approach that combines educational strategies with health training, potentially improving health literacy among adults and their families. Adults often serve as effective agents of health messaging,

influencing parental behaviors and contributing to community health improvement strategies (Nayoan et al., 2023; Bowen, 2023). To understand this dynamic, it is important to analyze how community health education can improve early detection policies for diabetes, particularly in socio-economically disadvantaged settings. Research indicates that community engagement enhances the dissemination of health knowledge, serving as a buffer against diseases such as diabetes associated with lifestyle choices (Rohimi et al., 2024). Local health workers trained in culturally relevant health messages can effectively convey important information, thereby improving the efficacy of health education initiatives (Yazdani & Heidarpoor, 2023).

In this situation, health education serves as a catalyst for behavioral change in addition to increasing awareness by giving families the information they need to detect and treat diabetes early (Muzakkir et al., 2021). The Mbolo Weki method prioritizes health literacy from an early age by fostering conversations about health between adults and their families. Such curricular models not only provide foundational knowledge about diet and exercise but also incorporate practical elements that promote active participation in health-related activities. This hands-on approach is vital for learners as it caters to diverse learning styles and encourages real-life application of knowledge, aligning with local dietary habits and health practices (Taşkıran, 2020; Liu et al., 2023).

The notion that better health education results in better health outcomes for adults is supported by current research, as demonstrated by initiatives to lower stunting and raise general health literacy (Nayoan et al., 2023; Vieira et al., 2022). Initiatives can leverage resources and expertise to develop comprehensive programs that educate adults and encourage families to adopt proactive health behaviors by cultivating partnerships between health agencies and educational institutions. By working together, stakeholders can address urgent community health needs, such as early diabetes screening and awareness, and guarantee the sustainability of health education initiatives (Long et al., 2022; Tong et al., 2022). Moreover, social integration plays a crucial role in effective health promotion strategies. Community-based approaches can bridge gaps in health knowledge and enable the development of educational programs tailored to meet the specific needs of underserved populations (Liu et al., 2023; Vanderslott et al., 2021). By leveraging community engagement and participatory learning, health education can strengthen connections among families, educational settings, and health services (Chen et al., 2023). These connections can lead to a more informed population capable of recognizing diabetes risk factors, facilitating earlier interventions and promoting healthier lifestyle choices (Raghupathi & Raghupathi, 2020).

Additionally, the rising incidence of diabetes highlights the critical need for public health programs that emphasize education-based chronic disease prevention as well as management. A strong pipeline of knowledge and practices that are essential for adults and their families can be established through the use of early health education interventions, such as the Mbolo Weki method. Longitudinal studies have indicated that comprehensive health education from an early age significantly influences lifelong health behaviors and subsequently alters the trajectory of chronic disease risks (Ramalepa, 2023). As the concept of health literacy evolves, aligning educational initiatives with community health strategies will be essential for the successful prevention and management of diabetes. The introduction of a structured curriculum that integrates health education principles is vital in fostering health-conscious communities, thereby reducing the incidence of chronic conditions among adults and their families. The proactive development of health education frameworks informed by community needs can support systemic changes in early education and public health policy (Gong et al., 2023; Malik et al., 2023; Teherani et al., 2021).

The novelty of this study lies in the application of the Mbolo Weki approach, which integrates local culture-based educational principles, in the context of health promotion, particularly related to early detection of DM. By focusing on early education, this study has the potential to fill a gap in the existing literature regarding the role of informal education in supporting public health policies. The purpose of this study is to explore and analyze the effectiveness of the Mbolo Weki method implementation in the context of early education as a strategy to support early detection of diabetes mellitus (DM) in the community.

Method

Types of Research

A quasi-experimental study design enables comparisons between a group receiving a treatment (intervention) and a control group receiving no treatment, and it was selected as the research method for assessing the efficacy of an intervention. Though it is not carried out in a fully randomized fashion like in a pure experiment, this method seeks to determine causal relationships.

Research Location

The research was conducted in Bima Regency, West Nusa Tenggara (NTB), an area still rich in local traditions, such as Mbolo Weki. This area has a significant population at risk of developing diabetes mellitus. This location was chosen to explore the effectiveness of educational methods rooted in local traditions in increasing public knowledge and awareness about diabetes mellitus.

Population and Research Sample

Those at risk for diabetes mellitus who were at least 30 years old made up the study population. This criterion focused on populations that, as a result of their dietary and lifestyle choices, have a tendency to possess higher risk factors for diabetes. Additionally, a number of clusters (villages) were chosen at random by the researchers to act as study subjects using the cluster random sampling technique. The community's

willingness to participate in health education and examinations was one of the inclusion criteria, and the sample was representative of that group.

Research Variables

There are two kinds of variables in this study. The "Mbolo Weki" method of early education is one of the independent variables, and its effects on the community will be assessed. Indicators of change, such as knowledge, attitudes, behavior, and the outcomes of random blood sugar (GDS) tests, are included in the dependent variables. Improvements in these final three areas following the intervention are anticipated to serve as the primary indicator of early education's efficacy.

Research Instruments

For data collection, researchers used several validated instruments. A questionnaire on knowledge, attitudes, and behaviors related to diabetes was designed to measure the community's understanding, views, and actions before and after receiving education. A digital blood glucose monitor was used to determine respondents' blood sugar levels. Additionally, a community engagement observation sheet was used to monitor active participation during the education process.

Research Procedures

This research was divided into three stages. The first stage was a pretest, where all participants were measured to obtain baseline data on knowledge, attitudes, behavior, and blood sugar levels. After that, in the second stage, an intervention was carried out using the mbolo weki method, which is expected to provide a more local and relevant approach for the community. During the educational implementation, researchers used participatory principles to increase community involvement. The third stage was a posttest, where

repeated measurements were conducted to analyze changes that occurred after the intervention. Additionally, a control group was also assigned to receive standard education without the mbolo weki method.

Data Analysis

The data obtained from this study were analyzed using several analytical techniques. Descriptive tests were used to describe the characteristics of the population and respondents. Normality tests were applied to determine data distribution before further analysis. To measure differences in means between groups, paired t-tests and independent t-tests were used. Additionally, chi-square tests were applied to analyze relationships between categorical variables and to evaluate changes in behavior and attitudes found through pre- and post-intervention measurements.

Results and Discussion

Table 1 presents the characteristics of respondents in the study on the implementation of early education using the Mbolo Weki method to support the early detection policy for Diabetes Mellitus (DM) in the community. The average age of respondents was 42.6 years, with a total of 120 participants. In terms of gender, the majority of respondents were female (55% or 66 people), while males comprised 45% (54 people). In terms of education, 40% of respondents had an elementary school education background, 35% had a junior high school education, and 25% had a high school education, indicating that basic education dominated this group. In terms of occupation, the majority of respondents worked as farmers or fishermen (58% or 70 people), while the remainder were engaged in other jobs (42% or 50 people).

Table 1. Respondent Characteristics

Characteristics	Description	Percentage	Total Respondents
Average Age	42.6 years	-	120
Gender	Woman	55%	66
	Man	45%	54
Education	Elementary School	40%	48
	Junior High School	35%	42
	Senior High School	25%	30
Work	Farmers/Fishermen	58%	70
	Other	42%	50

Table 2 presents a comparison between the intervention and control groups in the context of early education regarding early detection of diabetes mellitus (DM) based on improvements in knowledge scores, positive attitudes, and blood sugar testing behavior. In the intervention group, there was a significant increase

in knowledge scores from 56.4% to 82.3% (a 25.9% increase), while the control group experienced only a minor increase from 55.9% to 63.1% (a 7.2% increase). In terms of positive attitudes, the intervention group showed an increase from 48% to 85% (a 37% increase), compared to the control group which increased from

50% to 58% (an 8% increase). In blood sugar testing behavior, participants in the intervention group showed a significant increase from 20% to 72% (a 52% increase), while the control group only increased from 18% to 30% (a 12% increase).

Table 2. Comparison between the Intervention Group and the Control Group Regarding the Increase in Knowledge Scores, Positive Attitudes, and Blood Sugar Checking Behavior

Category	Total Samples	Initial Score (%)	Final Score (%)	Increase (%) Intervention	Initial Score (%)	Final Score (%)	Increase (%) Control
Knowledge	60	56.4	82.3	25.9	55.9	63.1	7.2
Positive Attitude	60	48	85	37	50	58	8
Blood Sugar Check Behavior	60	20	72	52	18	30	12

Table 3 presents the results of the Random Blood Glucose (RBG) test conducted on two groups, namely the intervention group and the control group, with a sample size of 60 participants each. In the intervention group, there were 15 participants (25%) who had an initial BG value ≥ 200 mg/dl, but after the implementation of the Mbolo Weki method, this number decreased to 8 participants (13%), indicating a decrease of 7 participants (-12%). Meanwhile, in the control group, 14 participants (23.3%) were detected with an initial BG value ≥ 200 mg/dl, and after the same period, the number only decreased by one participant to 13 (21.7%), recording a smaller decrease of -1 participant (-1.6%).

Table 3. GDS Results in Two Groups

Group	Number of Samples	Initial GDS (>= 200 mg/dl)	Initial Percentage (%)	Final GDS (>= 200 mg/dl)	Final Percentage (%)	Change in Amount	Percentage Change (%)
Intervention	60	15	25%	8	13%	-7	-12%
Control	60	14	23.3%	13	21.7%	-1	-1.6%

Table 4 presents a statistical analysis indicating significant results from the implementation of the Mbolo Weki method in early education to support early detection of diabetes mellitus (DM) in the community. The paired t-test results showed a p-value < 0.001, indicating an increase in knowledge in the intervention group. The independent t-test also yielded significant results with a p-value < 0.001, indicating a clear difference in knowledge between the treatment groups. Furthermore, the chi-square analysis, with a p-value < 0.001, indicated a significant relationship between the education received and behavioral changes among all respondents.

Table 4. Statistical Analysis

Test Type	p-value	Results	Condition	Group
Bound T Test	< 0.001	Significant	Increased knowledge on interventions	Intervention Group
Independent T-Test	< 0.001	Significant	Differences between groups	Treatment Group
Chi-square	< 0.001	Significant	The relationship between education and behavior	All respondents

When it came to knowledge improvement, the intervention group's knowledge scores increased significantly from 56.4% to 82.3%, or 25.9%, whereas the control group's knowledge scores increased only slightly, from 55.9% to 63.1%, or 7.2%. This improvement in understanding highlights how crucial educational initiatives are to raising people's diabetes literacy and encouraging improved self-management techniques and disease comprehension. According to Zhang et al., diabetic patients who possess greater health knowledge exhibit better self-management practices (Zhang et al., 2023). Such findings emphasize how enhanced knowledge contributes to individuals' ability to actively engage in their health management.

Concurrently, the uplift in positive attitudes within the intervention group, rising from 48% to 85% (a 37% increase), starkly contrasts with the control group's minor elevation from 50% to 58%. This sizable augmentation in positive attitudes can be attributed to increased awareness and understanding of diabetes management, as attitudes have been identified as influential in determining health behaviors, particularly in managing chronic illnesses like diabetes (Mohammed & Lafi, 2023). Mohammed and Lafi have noted that positive attitudes are integral to effective self-care and blood glucose management among individuals with type 2 diabetes (Mohammed & Lafi, 2023).

Additionally, compared to the control group, which saw a modest increase from 18% to 30% (a 12% increase),

the intervention group's blood sugar testing behavior showed a significant increase from 20% to 72% (52% increase). This research implies that participants may experience long-lasting behavioral changes as a result of proactive interventions. According to research by Li et al., people who have a positive outlook on their health are more likely to take part in self-care practices, like routine blood glucose testing, which is essential for preserving glycemic control in the treatment of diabetes (Li et al., 2022). The correlation between enhanced health knowledge, positive attitudes, and proactive health behavior is well-established, reinforcing the efficacy of educational interventions in modifying risky behaviors associated with chronic health conditions.

Additionally, the findings from Table 2 reflect a broader trend in the literature asserting the role of healthcare education in improving patient outcomes. Teoh et al. state that knowledge, combined with positive attitudes, significantly affects health outcomes in populations at risk for or managing diabetes (Teoh et al., 2023). This notion is further supported by studies that highlight that educational programs aimed at enhancing knowledge, shaping attitudes, and fostering strong health practices are pivotal for effective diabetes management and can effectively mitigate the risks associated with diabetes complications over time (Peng et al., 2024).

Several studies show that patients' attitudes and knowledge are closely linked to their self-management practices. Knowledge on its own is insufficient; it must be accompanied by a proactive mindset and a willingness to change to healthier habits. Li et al., for example, found that attitudes have a significant impact on diabetes patients' dietary choices and self-care behaviors, demonstrating the importance of having positive attitudes for successful diabetes self-management (Li et al., 2022).

In light of these findings, it is clear that structured educational interventions enhance knowledge and positive attitudes and drive individuals towards proactive health behaviors. This multifaceted approach is supported by research indicating that positive changes in knowledge and attitudes correlate with improved health practices, ultimately leading to enhanced management of diabetes (Li et al., 2022; Mohammed & Lafi, 2023; Teoh et al., 2023). The interplay of knowledge, attitudes, and practices offers a comprehensive model for understanding how educational programs can effectively reduce the burden of diabetes by empowering patients to take charge of their health.

The results presented in Table 3 highlight the efficacy of the Mbolo Weki method as an intervention to reduce Random Blood Glucose (RBG) values among participants in an educational setting concerning diabetes awareness and management. Specifically, the intervention group exhibited a notable decline in the number of participants with an initial blood glucose (BG) value of 200 mg/dl or higher, decreasing from 15 (25%) to 8 (13%), which translates to a substantial reduction of 7 participants or 12% (Shrestha & Joshi, 2023). Conversely, in the control group, only a slight decrease was recorded, moving from 14 (23.3%) to 13 (21.7%), reflecting only a 1 participant or 1.6% reduction (Hijriana et al., 2023).

These findings highlight how structured educational interventions may be able to significantly alter behavior and enhance health outcomes in populations at risk for diabetes. Table 4's statistical analysis supports the Mbolo Weki methodology's impact even more. A statistically significant increase in knowledge was found in the intervention group, as indicated by the dependent T-test's p-value of less than 0.001. This is consistent with research showing that focused diabetes education can significantly improve patients' comprehension and ability to manage their conditions (Alsous et al., 2020).

Moreover, the independent T-test also yielded significant results with a p-value <0.001, establishing the efficacy of the Mbolo Weki method itself and the pronounced difference in educational outcomes between the intervention and control groups (Shiferaw et al., 2020). Such statistical significance is critical in supporting the hypothesis that well-structured health education can lead to improved knowledge and consequently better health practices.

Furthermore, the Chi-square analysis conducted across all respondents yielded a compelling p-value of <0.001, which highlights a significant relationship between the education received and subsequent behavioral changes regarding diabetes management (He et al., 2022). This aspect is particularly pertinent, as it signifies that knowledge gained through education translates into better health behaviors, which can ultimately mitigate health risks and complications associated with diabetes mellitus (Lema & Gebeyaw, 2025).

The concept of education as a catalyst for changing health behaviors has been well-documented in literature, asserting that informed patients are more likely to engage in self-care practices that reduce their health risks (Ernersson et al., 2023). In a broader context, the outcomes of this study resonate with the findings of numerous other research works examining diabetes education and management strategies. For example, a systematic review documented that diabetes education not only increases knowledge but also improves self-management practices, ultimately leading to better glycemic control (Diriba et al., 2023).

Further research also shows how sociodemographic characteristics affect diabetes

knowledge and self-management practices. It has been demonstrated that a person's ability to successfully manage diabetes is greatly influenced by their educational background, financial situation, and access to healthcare resources. This places the current study's findings in context because the intervention group's better health outcomes were largely due to the participants' educational backgrounds and exposure to health education (Ibrahim et al., 2023).

Critically, this discussion brings forth an intriguing proposition regarding the ongoing efforts necessitated by healthcare professionals to implement comprehensive diabetes education programs that not only educate patients but also involve their families and communities to reinforce learning and promote supportive environments (Silva-Tinoco et al., 2024). Such an approach underscores the collaborative nature of diabetes management, emphasizing the need for extensive community involvement as vital for sustainable health improvements.

Educational attainment is often correlated with better diabetes self-management practices. For instance, higher education levels have been linked to improved access to diabetes-related information and resources, which in turn fosters greater self-care behavior, adherence to treatment protocols, and overall health literacy among patients with diabetes (Bakara & Kurniyati, 2022; Chinedum Okoye et al., 2021; Utama et al., 2021). Studies have shown that individuals with lower educational backgrounds tend to have less effective self-management skills, which can stem from inadequate understanding of diabetes management strategies, often leading to reliance on familial support for their care (Alruhaim et al., 2021; Tetteh et al., 2024). This underscores the critical role education plays in equipping patients with the knowledge necessary to independently manage their conditions (Romo-Romo et al., 2021).

Economic status also plays a crucial role in diabetes management behaviors. Individuals from lower economic backgrounds often face barriers to accessing healthcare services and relevant educational resources, thereby complicating their ability to self-manage diabetes effectively. Research indicates that socioeconomic disparities significantly impact diabetes control and management, particularly in systems where access to insurance and healthcare resources is limited (Chinedum Okoye et al., 2021; Jeruto Bet & Bosede Ade-Oshifogun, 2024; Whitehouse et al., 2022). This gap in resource availability can lead to subpar health outcomes compared to those with sufficient financial means to engage in preventative care and health education interventions (Romo-Romo et al., 2021; Whitehouse et al., 2022).

Moreover, access to healthcare resources, including the availability of diabetes education programs, significantly impacts self-management behaviors. Studies have shown that effective diabetes education interventions can enhance patients' self-efficacy and motivation, leading to better glycemic control and adherence to self-management tasks such as diet and exercise (Ahmad et al., 2022; Ernawati et al., 2021). Educational programs, particularly those tailored to address individual needs based on specific sociodemographic backgrounds, have proven crucial in fostering effective diabetes management strategies (Tetteh et al., 2024).

The interdependent roles of education, financial security, and healthcare access demonstrate how sociodemographic factors affect diabetes knowledge and self-management practices. Better diabetes management outcomes can be achieved by addressing the particular difficulties faced by people from different backgrounds through improved health education initiatives, especially those aimed at diverse populations. Because participant health outcomes were positively correlated with their exposure to education and health education, the current study's findings are consistent with this body of literature (Sharma et al., 2024).

Conclusion

The application of the Mbolo Weki method demonstrates substantial efficacy in enhancing diabetes detection and management behaviors within the community, particularly for individuals at risk of Diabetes Mellitus. The quasi-experimental study conducted in Bima Regency reveals a significant improvement in blood sugar monitoring practices among participants exposed to the intervention compared to the control group. Furthermore, a noteworthy decrease in participants with excessively high blood sugar levels was observed in the intervention group, highlighting the potential of this educational approach to effect meaningful health behavior change. Statistical analyses support these findings, indicating a robust relationship between educational interventions and subsequent health outcomes. Overall, the Mbolo Weki method emerges as a viable strategy for early diabetes identification and prevention within early education frameworks.

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