



## Health Education and Utilization of Turmeric Rhizomes for the Prevention of Diabetes Mellitus

Retno Widyani <sup>1</sup>, Gysella Aedeliya Agustin <sup>2</sup>, Andri Hermawan <sup>3</sup>

<sup>1</sup> University of Muhammadiyah Cirebon, Indonesia. Email: [retno.widyani@umc.ac.id](mailto:retno.widyani@umc.ac.id)

<sup>2</sup> University of Muhammadiyah Cirebon, Indonesia. Email: [gysellaedeliyaa@gmail.com](mailto:gysellaedeliyaa@gmail.com)

<sup>3</sup> University of Muhammadiyah Cirebon, Indonesia. Email: [andri.hermawan@umc.ac.id](mailto:andri.hermawan@umc.ac.id)

Corresponding Author. Email [retno.widyani@umc.ac.id](mailto:retno.widyani@umc.ac.id)

### Abstract

**Background.** Diabetes Mellitus is a chronic disease whose number of sufferers is increasing every year and causes various serious health problems. Preventing this disease can be achieved by improving health literacy and using medicinal plants from the family (TOGA). One plant with potential is turmeric (*Curcuma longa* L.), which contains curcumin, a natural antidiabetic agent.

**Purpose.** Providing understanding to the public about the prevention of Diabetes Mellitus, as well as training skills in processing turmeric rhizomes as a complementary therapy.

**Method.** The methods used include initial surveys, health education, the practice of making herbal turmeric drinks, and evaluation using pre- and post-tests.

**Result.** The results of the activity showed an increase in public knowledge of risk factors for Diabetes Mellitus, understanding the benefits of turmeric, and the ability to make simple herbal remedies.

**Conclusion.** With this activity, the community is expected to adopt a healthy lifestyle grounded in local wisdom through the sustainable use of TOGA.

**Keywords:** Diabetes Mellitus; health education; turmeric rhizome; complementary therapy; TOGA



© 2025 The Author(s). This article is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source.

### INTRODUCTION

Diabetes Mellitus (DM) is a non-communicable disease whose prevalence continues to increase along with changes in people's lifestyles. A report by the International Diabetes Federation (2021) estimates that the number of people with DM worldwide is 537 million and is likely to increase to more than 640 million in the next decade. In Indonesia, the prevalence of DM has also increased significantly due to the consumption of high-sugar foods, a lack of physical activity, and limited public awareness of a healthy lifestyle (Ministry of Health of the Republic of Indonesia, 2022). This condition is a big challenge because DM can cause serious complications such as kidney failure, heart disease, and limb amputation.

Health education plays a vital role in suppressing the growth rate of DM cases. According to Notoatmodjo (2014), health education can change individuals' mindsets and behaviors, making them more concerned about their health. Through counseling, the community can understand risk factors and learn about prevention through a healthy diet, regular exercise, and periodic health checkups.

In addition to health education, using local resources such as Family Medicinal Plants (TOGA) can help support DM prevention. One of the plants commonly used is turmeric (*Curcuma longa* L.). The curcumin content in turmeric is known to have anti-inflammatory, antioxidant, and antidiabetic activity (Gupta et al., 2013). Thus, integrating health education with the use of turmeric as a complementary therapy can be a strategy based on local wisdom that is easy for the community to apply.

The formulation of the problem in this activity is how to increase public understanding of the prevention of Diabetes Mellitus and skills in processing turmeric rhizomes as a complementary therapy. The purpose of the activity is to provide health education on Diabetes Mellitus and to introduce the use of turmeric as one of the TOGA, which can be processed into herbal drinks to support disease prevention.

Recent research on the prevention of Diabetes Mellitus (DM) has shifted from a curative to a promotive-preventive approach, grounded in health education and behavior change. Various public health studies confirm that increasing health literacy, especially regarding risk factors, diet, physical activity, and early detection, significantly reduces the incidence of DM and its complications. In this context, health education is positioned not only as the delivery of information but also as a structured, sustainable behavioral intervention at the community level.

In line with that, the trend of using Family Medicinal Plants (TOGA) as a complementary therapy for the prevention and management of DM is also developing. Turmeric (*Curcuma longa* L.) is one of the most studied herbal commodities because of its anti-inflammatory, antioxidant, and antidiabetic content of curcumin. Pharmacological and clinical studies show that curcumin can improve insulin sensitivity, reduce oxidative stress, and protect pancreatic  $\beta$  cells, so it has the potential to support blood glucose control. Research on the combination of turmeric rhizome extract with other plants in patients with type 2 DM further strengthens turmeric's position as a supporting agent for modern therapies.

## **LITERATURE REVIEW**

### **Diabetes Mellitus as a Global Health Problem**

Diabetes Mellitus (DM) is a chronic non-communicable disease whose prevalence is increasing significantly worldwide. A report by the International Diabetes Federation shows that

more than 537 million people are living with DM, and that number is predicted to continue to grow in the coming decade. In Indonesia, the trend of increasing DM is influenced by high sugar consumption, obesity, low physical activity, and low public health literacy. This condition makes DM one of the causes of disability and death due to complications such as kidney failure, cardiovascular disease, neuropathy, and limb amputation. On the other hand, education-based prevention efforts and behavior change are considered more effective than long-term curative treatment.

### **The Importance of Health Education in Diabetes Prevention**

Health education plays a strategic role in reducing the prevalence of DM by increasing knowledge, fostering positive attitudes, and encouraging preventive behaviors. Notoatmodjo (2014) emphasized that health education is able to influence people's mindset so that they care more about a healthy lifestyle. Several studies (Sari & Wulandari, 2021; Widyaningrum & Hidayati, 2022) show that education can increase understanding of DM risk factors, the importance of early detection, dietary regulation, and physical activity. With greater knowledge, preventive behaviors will be easier to implement, especially in communities with low health literacy.

### **Family Medicinal Plants (TOGA) as Complementary Therapy**

The use of Family Medicinal Plants (TOGA) is part of a health approach based on local wisdom. TOGA can be used as an adjunct therapy in the prevention and management of DM, especially in rural areas with limited access to modern healthcare services. Plants such as turmeric, red betel, and sambiloto have been widely used in traditional medicine because they contain bioactive compounds with the potential to lower blood glucose levels.

Ethnobotanical studies (Septiani et al., 2025) show that local communities use turmeric and other herbal plants as alternatives to diabetes treatment. This practice is strengthened through community empowerment activities, including counseling and training in herbal plant processing.

### **Antidiabetic Content and Mechanism of Turmeric (*Curcuma longa* L.)**

Turmeric is a herbaceous plant with the main active ingredient, curcumin. Curcumin is known to have anti-inflammatory, antioxidant, and antidiabetic activity, as demonstrated in various clinical and experimental studies (Gupta et al., 2013; Hussain et al., 2019). Some of the

mechanisms of action of curcumin in lowering the risk and improving the condition of DM include:

1. Improves insulin sensitivity
2. Inhibits oxidative stress, which is a key factor in the development of DM
3. Reduces chronic inflammation
4. Slows down glucose absorption
5. Protects pancreatic  $\beta$  cells from metabolic damage

In addition, research on the combination of turmeric with other herbs, such as garlic, showed potential to lower blood glucose levels in patients with type 2 diabetes (Setiawan et al., 2011).

### **The Effectiveness of Practice-Based Education in the Utilization of Turmeric**

Recent studies show that education accompanied by hands-on practice, such as herbal brewing demonstrations, yields more significant improvements in people's knowledge and skills (Aziz et al., 2024; Sholih et al., 2021). This participatory approach increases public understanding of:

1. How to process turmeric into a herbal drink
2. Safe dosage and frequency of consumption
3. Benefits of curcumin in the prevention of DM complications

Long-term changes in healthy attitudes and behaviors also accompany improvements in these skills.

### **Community Knowledge and Attitudes to the Utilization of Turmeric**

Several studies (Ghassani, 2024; Hardiyani, 2024; Martin, 2024) emphasized that the public's knowledge, especially among the younger generation, about the benefits of turmeric as an antidiabetic agent remains relatively low. However, practice-based education has proven effective in increasing positive attitudes and people's desire to use turmeric as a complementary therapy. This shows that there is an excellent opportunity to develop TOGA-based programs to improve public health.

1. DM is a global health problem that requires effective prevention strategies.
2. Health education has been shown to improve knowledge and behavior of DM prevention.
3. Turmeric contains curcumin that has antidiabetic potential so that it can be used as a complementary therapy.

4. The TOGA approach based on local wisdom is relevant to improving public health.
5. Education accompanied by turmeric processing practices has been proven to improve skills and the application of healthy behaviors.

## **METHOD**

The approach used in this activity is participatory and educational. The stages of the activity consist of:

1. Initial survey – Identify the level of public knowledge related to DM and utilization TOGA.
2. Health education – Counseling on risk factors, symptoms, and preventive measures for DM.
3. Demonstration – The hands-on practice of making turmeric herbs in the form of herbal drinks.
4. Mentoring – Providing participants with the opportunity to try to process turmeric independently.
5. Evaluation – Measure the improvement of knowledge and skills with pre-tests and post-tests.
6. The instruments used were questionnaires, practice observation sheets, and activity documentation.
7. Data analysis was carried out descriptively by comparing the results before and after the activity.

## **DISCUSSION**

Health promotion tends to integrate health education with the direct practice of processing medicinal plants, for example, training in making antidiabetic herbal remedies. This intervention model is considered more effective because it not only increases knowledge but also practical skills and a positive attitude towards TOGA use. Various counseling activities that combine lectures, demonstrations, and mentoring have proven to be able to change people's perceptions from just "knowing" to being "able and willing to practice" the use of herbal plants in daily life. However, most previous studies have focused either on the pharmacological aspects of turmeric or on the effectiveness of general health education, without specifically combining the two into a single, measurable intervention package. This is where the article "*Health Education and the Utilization of Turmeric Rhizomes for the Prevention of Diabetes Mellitus*" comes into play: this article represents the state of the art at

the community level, which is to integrate DM risk factor education with training on the use of turmeric rhizomes in the form of herbal drinks, then evaluate its impact through a pre-post test design on knowledge, understanding of the benefits of turmeric, and herb brewing skills. This approach illustrates the recent development that effective DM prevention programs need to be based on local, participatory, and skill-oriented wisdom, not just one-way counseling.

This research activity has a positive impact on participants' knowledge and skills. Before implementation, most people only had a limited understanding of Diabetes Mellitus. They know this disease as "sugar disease" without knowing in depth about the risk factors, complications, and prevention efforts. In addition, people are not accustomed to using family medicinal plants, such as turmeric, for health support. After receiving health education, participants' knowledge increased, especially about healthy diets, the importance of physical activity, and early detection of Diabetes Mellitus (Alok et al., 2020; Azis et al., 2024; Fukrapsi & Nakiya, 2020). Through practical activities, participants were also able to make turmeric herbs simply. This process involves preparing ingredients, using boiling techniques, and presenting herbs. This shows an increase in practical skills that were not previously possessed.

The results of the evaluation using pre-test and post-test showed a significant increase. Participants who initially did not understand Diabetes Mellitus and had never processed turmeric into a health herb were able to explain the material again and practice making herbal drinks independently after the activity.

Table 1. Participant Pre-test and Post-test Results Data

<b>Indicators</b>	<b>Before (Pretest)</b>	<b>After (Posttest)</b>	<b>Increased (%)</b>
Knowledge about Diabetes Mellitus	35%	75%	40%
Understanding the benefits of turmeric	25%	75%	50%
Herbal herb-making skills	15%	70%	55%

Table 2. Goal Achievement Indicators

<b>Indicators Purpose</b>	<b>Condition Beginnin</b>	<b>Condition End</b>	<b>Benchmark Success</b>
Understanding DM prevention	Low	Increase	≥75% of participants understand
Utilization of turmeric as therapy	Not yet implemented	Start practicing	Minimum one herb practice
Implementation of a healthy lifestyle	Less care	Get used to it	There is a change in behavior

The use of turmeric can increase public awareness, knowledge, and skills. The most significant improvement was observed in participants' herbal potion-making skills, which had never been achieved before (Ghasani, 2024; Gupta, 2013; Hardiyani, 2024; Husain, 2018; Septiani et al., 2025). Although the literature shows that health education is effective in increasing public knowledge about the prevention of Diabetes Mellitus, most previous studies still have some limitations:

The dominant research focus is on the pharmacological aspects of turmeric, rather than its community applications. Most studies on turmeric (*Curcuma longa* L.) have focused on the mechanisms of curcumin as an anti-inflammatory, antioxidant, and antidiabetic, using laboratory or clinical trials (e.g., Gupta et al., 2013; Hussain et al., 2019). However, community-based research examining *how people use turmeric in daily life* remains very limited.

The lack of integration between DM health education and TOGA utilization training. Many diabetes counseling programs focus only on increasing knowledge about risk factors and a healthy lifestyle. In contrast, TOGA training programs are often not combined with education on chronic disease prevention. The gap arises from the lack of research combining DM education with practical skills for *cultivating herbal plants*, especially turmeric.

There is a lack of evaluation models that objectively measure community skill improvement. Some community service studies report increased knowledge, but few measure changes in skills for making herbal remedies or applying TOGA independently. This article fills this gap by using pre-tests and post-tests, along with practical observation sheets, to measure skills.

There has been little research that uses a participatory approach to community empowerment. Participatory-based intervention models (hands-on practice, mentoring, and demonstration) are still rarely applied in DM prevention programs, which are generally dominated by one-way lectures. A gap arises because there is no integration of participatory methods with health materials and herbal processing as a form of comprehensive behavior change.

Lack of documentation on the effectiveness of TOGA as a health education medium. Studies on TOGA still focus on the biological benefits of plants rather than on how they can be used as educational *tools* to improve public health awareness and behavior. This article fills that gap by placing turmeric not only as an herb but also as a means of health education.

### **Research Novelty**

Based on the research gap above, the main novelty of this article lies in the integration of approaches, methods, and intervention objectives. The elements of novelty that can be affirmed are:

1. Integration of DM health education and turmeric utilization practices in one integrated intervention model. There is not much community research that *combines* an understanding of DM with the training of making turmeric herbs. This approach is new and has a two-way impact: (1) increasing health literacy, and (2) improving herbal concoction skills.
2. A participatory-educational approach based on local wisdom (TOGA) as a DM prevention strategy. This activity positions turmeric rhizomes as an educational medium in harmony with the community's culture and practices. This is an innovation because it links the prevention of chronic diseases with the use of readily accessible local plants.
3. The measurement is structured against three aspects at once: knowledge, understanding of the benefits of herbs, and practical skills. This article not only measures the increase in knowledge but also the community's skills in making herbal remedies. This is an element rarely encountered in similar research that generally focuses solely on knowledge.
4. Presentation of an empowerment model that can be replicated in other communities. The interventions are simple, inexpensive, and reusable. The novelty lies in the design of interventions applicable at the village, posyandu, or other community group scale without the need for laboratory facilities.

5. Making turmeric not only an object of medicinal plants, but also a *tool for transforming* people's behavior. This article introduces a new paradigm: using herbal plants not just for their biological effects, but also as a means of behavior change towards a healthy lifestyle.

## CONCLUSION

Health education activities combined with the use of turmeric rhizomes have been proven to increase community understanding and skills in efforts to prevent Diabetes Mellitus. Participants gained new knowledge about disease risk factors, the importance of a healthy lifestyle, and how to process turmeric as a simple herbal drink. This program not only has a short-term impact in the form of increased knowledge, but also has the potential to create long-term behavioral changes that support a healthy lifestyle. The use of TOGA such as turmeric can be a practical, cheap, and sustainable solution to support public health and prevent degenerative diseases.

## BIBLIOGRAPHY

- Alok, A., Singh, I. D., Singh, S., Kishore, M., Jha, P. C., & Iqbal, M. A. (2020). Curcumin: A review of its effects on human health. *International Journal of Applied and Basic Medical Research*, 10(4), 181–187.
- Aziz, A. D. A., Damayanti, A., Fatiha, A. A., Herlina, D. H., Wardana, F. C., Nafi, M. I & Setyadi, Y. B. (2024). The Utilization of White Turmeric as Supportive Therapy for Diabetes Treatment in Laban Village. *Community Service Webinar Proceedings*.
- Fukrapti, R., & Naqiyya, N. (2020). Turmeric Rhizome as a Preventive Therapy for Diabetic Neuropathy. *Journal of Professional Nursing Research*, 2(2), 111-118.
- Ghassani, R. F. (2024). *Knowledge and Attitude of SI Pharmacy Students Towards Turmeric (Curcuma longa) as a Prevention of Diabetes* (Doctoral dissertation, Bhakti Kencana University).
- Gupta, S. C., Patchva, S., & Aggarwal, B. B. (2013). Therapeutic roles of curcumin: lessons learned from clinical trials. *AAPS Journal*, 15(1), 195–218.
- Hardiyani, A. (2024). *The Relationship between Knowledge and Attitudes of Non-Health Students to the Use of Turmeric as One of the Efforts to Prevent Diabetes Mellitus* (Doctoral dissertation, Bhakti Kencana University).
- Hussain, H., Green, I. R., & Saleem, M. (2019). Therapeutic potential of curcumin for the treatment of diabetes: Mechanistic insights. *Journal of Cellular Physiology*, 234(5), 6253–6261.
- Ministry of Health of the Republic of Indonesia. (2022). *Health Profile of Indonesia 2022*. Jakarta: Ministry of Health of the Republic of Indonesia.
- Martin, S. M. P. (2024). *Knowledge and Attitude of Diploma in Pharmacy Students Towards the Use of Turmeric as One of the Efforts to Prevent Diabetes Mellitus* (Doctoral dissertation, Bhakti Kencana University).
- Notoatmodjo, S. (2014). *Health Behavioral Sciences*. Jakarta: Rineka Cipta.

- Sari, R., & Wulandari, L. (2021). The effectiveness of health education on increasing knowledge of diabetes prevention in the community. *Health Scientific Journal*, 13(2), 145–152.
- Septiani, F., Suriani, C., Panjaitan, G., Ramadina, C. S., Warohmah, S., Diana, P. & Yanti, S. (2025). An ethnobotanical study of the use of red betel nut (*Piper crocatum*) and turmeric (*Curcuma longa*) as a medicinal plant for diabetes mellitus in the Karo tribe community. *Journal of Intellectual and Scholar of the Archipelago*, 2(4), 7672-7681.
- Setiawan, A. S., Yulinah, E., Adnyana, I. K., Permana, H., & Sudjana, P. (2011). Antidiabetic effect of the combination of garlic extract (*Allium sativum* Linn.) and turmeric rhizome (*Curcuma domestica* Val.) with a comparison of glibenclamide in patients with Type 2 Diabetes Mellitus. *Bandung Medical Magazine*, 43(1), 26-34.
- Sholih, M. G., Saul, L. S., & Zacharias, J. M. (2021). Counseling of Sambiloto and Turmeric Rhizomes for Antidiabetes Mellitus in Bengle Village, Karawang Regency, West Java. *Socioeducation: Scientific Journal of Educational and Social Sciences*, 10(2), 280–285.
- Widyaningrum, R., & Hidayati, N. (2022). The influence of health education on community prevention behavior for non-communicable diseases. *Journal of Nursing and Public Health Scholar Utama*, 11(1), 24–32.