ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Berinan, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 14 No. 1, Februari 2026, Hal. 232-239

THE EFFECTIVENESS OF "FRESHIMA" ON KNOWLEDGE OF PREVENTING TYPE 2 DIABETES MELLITUS AT YAYASAN CAHAYA YATIM AL IKHLAS

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Abstract

Limited facilities, parasana and access to health information, the loss of supervisory and guidance functions from parents make santri at the Cahaya Yatim Al-Ikhlas Foundation vulnerable to having risk factors that trigger T2DM such as the habit of consuming sugar-sweetened packaged drinks or high sodium snacks, family history of DM to the lack of opportunity to obtain health information. The purpose of this study was to determine the effectiveness of the FRESHIMA program on increasing knowledge of preventing T2DM in students at the Cahaya Yatim Al-Ikhlas Foundation in Bogor. This research is a quantitative study with a quasi-experimental method on *pretest* and *posttest* without control to 60 adolescent students as respondents. Interventions to increase adolescents' knowledge of T2DM prevention in adolescent students at the Cahaya Yatim Al-Ikhlas Foundation were carried out using a facilitation method using FRESHIMA flip sheet educational media designed to increase knowledge in efforts to carry out T2DM prevention. The results showed an increase in score of 11.33 on the posttest with an average respondent score of 88.30 compared to the pretest score before the intervention of 77.17 and a known *p-value* of 0.000 (*p-value* <0.05 at α = 5%), so it was concluded that the FRESHIMA Facilitation program intervention was effective in increasing knowledge about T2DM prevention behavior in adolescent students at the Cahaya Yatim Al-Ikhlas Foundation. This effectiveness is influenced by a participatory learning approach that emphasizes the active involvement of participants in the learning process, and group discussions, so as to motivate them to apply it in their daily health behavior. Efforts are needed to develop and utilize the FRESHIMA program through increased involvement and interprofessional collaboration between academics, health workers and health service units and other related units to expand the scope of intervention implementation in efforts to increase knowledge and prevention of T2DM in adolescents.

Keywords: Effectiveness, Type 2 Diabetes Mellitus, Knowledge, Prevention

Introduction

Disease trends in society have undergone many changes as shown by the increase in degenerative diseases due to socio-cultural, economic and lifestyle changes, one of which is Diabetes Mellitus (DM), a chronic metabolic disease with high blood sugar levels that can cause endocrine disruption of insulin production in the body, currently known as the mother of all diseases due to the risk of complications, damage to organs and body parts to the risk of death of DM events with the incidence of DM until 2045 is expected to reach 783 million [(1,2)]. The form of DM based on insulin levels in the body consists of Type 1 Diabetes Mellitus (1TDM) which is dependent on insulin in the body and Type 2 Diabetes Mellitus (T2DM) which is not dependent on insulin, this type is the most common form of DM, which accounts for 90% to 95% of the total incidence of DM worldwide or prevalence reaches 9.3%. This number is expected to increase to 439 million by 2030. [(3,4)]

Submitted: July-2025 Received: September-2025 Available Online: February-2026

The increase in the incidence of T2DM is increasing, not least in children and adolescents as a consequence of the global obesity epidemic and physical inactivity, with an average of more than 200 children and adolescents diagnosed with T2DM every day [5]. The prevalence of T2DM in Japan among 6-12 year olds has increased from 7.3/100,000 to 13.9/100,000 population, which is closely related to changes in eating habits and cases of adolescent obesity in the last ten years, leading to a doubling of T2DM for adolescents every five years [6]. T2DM in children and adolescents can be more complicated and dangerous than in adults with factors contributing to increased risk including: obesity, family history, ethnicity, lifestyle, history of diabetes during pregnancy, high calorie diet, polycystic ovary syndrome (PCOS), cholesterol and hypertension, TV *bingeing*, social, cultural and geographical factors and environment [2,7]. T2DM at a younger age contributes to more cases of chronic cardiovascular diseases, such as hypertension, hyperlipidemia, nephropathy, and retinopathy that can reduce life expectancy by up to 15 years and the risk of serious and chronic complications can appear by the age of 40 years. The high financial risk due to medical expenses, decreased productivity, the risk of disability due to stroke and other health risks make the need for education and knowledge improvement in preventing T2DM important. [2]

A healthy lifestyle is the main key to preventing T2DM but this is contrary to the current lifestyle of adolescents, adolescents tend to live less regularly and are at risk of causing diabetes in the future. Risks seen from the aspect of adolescents' diet, among others, are fond of consuming *fast food* and *junk food*, more interested in consuming food from outside the home such as in school canteens and street vendors without paying attention to the nutritional content of food, the intensity of food consumption in daily snacks with high fat content and low fiber, vitamins and minerals. In the socio-cultural aspect, the development of technology also causes reduced physical activity of adolescents and can affect one's health. [3]

Early prevention of T2DM in adolescents has a long-term impact on efforts to prevent type 2 DM because it can reduce the risk of increasing incidence rates, reduce serious complications at a young age which are closely related to decreased quality of life, increased morbidity and mortality at productive age, reduce the economic burden due to health financing [8,9]. Education plays a key role in fostering health behavior patterns that will continue from adolescence to adulthood. So designing health interventions through empowering adolescents is not only able to increase knowledge, influence beliefs but increase health confidence and health-related decision-making skills. [2]

The optimization of life development is determined by the quality of physical and mental health from childhood to adulthood, but unlike children in general, orphans often face various limitations so that they are vulnerable to the risk of physical and mental health problems caused, among others, by economic factors that affect well-being, the loss of child and parent bonds or the lack of emotional and social connection in early life causes children not to get well-being which is the basis for psychology and learning in the future [10]. UNICEF defines orphans as children under the age of 18 who have lost one or both parents due to death and Orphanages or Child Social Welfare Institutions (LKSA) are child protection institutions that provide protection, educate, accommodate, and maintain orphans, orphans and abandoned children. Environmental and health conditions in orphanages need to be considered, because children are very vulnerable to health problems [8]. Until 2023. the number of orphans worldwide was recorded at 140 million children with 60 million or >50% of them living in Asia [10,11]. Various limitations faced in daily life such as lack or loss of care and attention from parents, physical neglect or sanitary hygiene due to lack of care to the risk of malnutrition lead to increased health problems such as health problems to increased risk of death in children in orphanages. The highest presentation of health problems in residents in orphanages include respiratory system disorders, digestive system disorders (majority diarrhea), skin diseases, anemia, skin allergies to dental caries and other non-communicable diseases [11]. The risk of Type 2 DM in foster children in orphanages occurs, among others, due to overweight or obesity, unhealthy diet by consuming foods high in sugar and fat

and fat rendal, sedentary lifestyle or lack of physical activity which increases the risk of insulin resistance, genetic history of DM in the family, lack of education about the prevention of Type 2 DM which causes minimal knowledge and an increase in unhealthy living behavior, psychological stress caused by the loss of parents or other factors that affect metabolism and limited access to health facilities that hinder early detection and prevention of T2DM in adolescents in orphanages. [4,12,13]

Research by Soliman, et. Al (2022) explains epidemiological data indicate an urgent need for active evidence-based intervention methods to prevent T2DM. Interventions begin with screening, especially in high-risk groups to detect obesity, prediabetes, and asymptomatic T2DM. Followed later by a population-based approach to prevention and implementation of lifestyle intervention programs for nutrition management, physical activity, and *screen* time in children and adolescents as well as encouraging and improving health education programs (family, school, social clubs, and media) to increase awareness of healthy diet and lifestyle patterns in children and adolescents. [14]

Various limitations that affect the guarantee and quality of health of foster children Orphanage foundations, one of which is the Cahaya Yatim Al Ilkhlas Cibinong Foundation. The number of students reaches 63 people with the self-management of the coach as well as the caregiver of the Foundation and relying on assistance from donors to meet the needs of clothing, food and shelter at the Foundation. Limited facilities, parasana and access to health information to adolescent students make a lack of health knowledge, not least related to the prevention of T2DM disease. The loss of the function of supervision and guidance from parents makes santri who are included in the group of children and adolescents vulnerable to having health behaviors that trigger the incidence of non-communicable diseases such as type 2 DM, including: having a family history of DM, excess Body Mass Index (obesity), puberty which causes hormonal changes and the risk of insulin resistance, high consumption of sugar-sweetened beverages, unhealthy diet, lack of physical activity to psychological stress or lack of emotional support from the family which has an impact on health behaviors such as diet and exercise. . In a preliminary study of 10 adolescent students, it was found that 6 people had a family history of DM, all students had a habit of consuming sugar-sweetened packaged drinks or high-sodium food snacks almost every day when there was an opportunity that could be obtained easily at stalls around the foundation environment. All students stated that they had just obtained health information related to the prevention of T2DM in the implementation of the Smart Healthy Youth Facilitation Program to Prevent Diabetes Mellitus for Advanced Indonesia (FRESHIMA) implemented by Advanced Indonesia University students. Through this study, it is hoped that the effectiveness of the FRESHIMA program on increasing knowledge of preventing Type 2 DM in adolescent students at the Cahaya Yatim Al-Ikhlas Foundation in Bogor is known.

Research by Sari et.al (2022) showed that school-based intervention programs and peer-led interventions were able to increase adolescent knowledge, change attitudes, and preventive behaviors that could reduce the incidence of T2DM by 54% [15]. Knowledge about prevention in adolescents has been recognized as a key factor in reducing the risk of T2DM disease incidence, but systematic and sustainable intervention efforts in improving knowledge are currently limited. A program designed as an adaptation of healthy *lifestyle-focused* interventions with a *human-centered* approach is needed to optimize future T2DM prevention outcomes [16]. This study aims to determine the effectiveness of the implementation of the FRESHIMA Facilitation Program implemented at the Cahaya Yatim Al-Ikhlas Foundation in Bogor on increasing knowledge of Type 2 DM prevention behavior in adolescent santri groups. The research integrates aspects of empowerment and education that are relevant to adolescents and is expected to produce a formulation of recommendations in the implementation of education and empowerment-based health education through the development of the FRESHIMA program as an empowerment-based health education effort and participatory approach.

Methods

This study is a quantitative study with a quasi-experimental method on *pretest* and *posttest* without control which aims to analyze the effectiveness of the FRESHIMA Facilitation program on increasing knowledge of T2DM prevention in adolescents at YCYA Cibinong. The population in this study were all students at the Cahaya Yatim Al-Ikhlas Foundation with 60 students as respondents. Intervention efforts are carried out by providing material and knowledge about definitions, blood sugar tolerance groups, types of DM, risk factors, early symptoms, complications, simulating calculating sugar levels in packaged drinks, T2DM prevention behavior and building participant commitment. The material was provided in the form of health facilitation activities using interactive media flip sheets. After the respondents registered in each group, followed by filling in the pre-test and followed by each opening of the delivery of the aims and objectives of the activity and agreeing on technical matters to be carried out with a total of 60 respondents divided into 10 groups, each accompanied by 1 (one) co-facilitator, while the guide in this activity was 1 (one) facilitator. The flip sheet media is designed not only to provide one-way information to participants regarding definitions, recognizing other terms of DM, sugar level tolerance groups, types of DM, early symptoms, how to calculate sugar levels in packaged beverages and DM prevention behaviors but there are also sheets that have been designed to help facilitators explore participants' knowledge related to risk factors, complications of DM to simulate the calculation of sugar levels in packaged beverages and develop and convey commitments related to DM prevention. After a series of facilitation activities were carried out, participants returned to fill in the post-test by filling in the questionnaire sheet. Results were analyzed using SPSS and data presentation was done by compiling narratives and tables.

Results

Normality Test of Data Distribution Knowledge of T2DM prevention in adolescents at the Cahaya Yatim Al Ikhlas Cibinong Foundation

Table 1. Normality Test Results

Group	*p-value*
Pretest	0,725
Posttest	0,669

Source: primary data processing results (2024)

Table 1 displays the results of the Kolmogorov-Smirnov Test conducted to see the normality of data distribution on the measurement of knowledge about T2DM prevention in adolescents at the Cahaya Yatim Al Ikhlas Cibinong Foundation both before and after intervention through the implementation of the FRESHIMA Facilitation program which is known to have a p-value> 0.05, so it is concluded that all data are normally distributed.

Analysis of the Effectiveness of FRESHIMA Facilitation on Increasing Adolescent T2DM Prevention Knowledge at Yayasan Cahaya Yatim Al-Ikhlas Cibinong

Table 2. Analysis of the Effectiveness of "Freshima" Facilitation on Increasing Knowledge of T2DM Prevention

Variable	Mean	Mean Difference	Std. Deviation	Std. Error Mean	*p-value*
Pretest	77,17	11,13	5,64	1,03	0,000
Posttest	88,30		4,65	0,85	

Source: primary data processing results (2024)

Based on table 2, the average pretest score of knowledge about T2DM prevention before the intervention was 77.17 and increased to 88.30 on the posttest after the implementation of the FRESHIMA Facilitation program, which means that there was an increase in the average score of knowledge about T2DM prevention among adolescents at the Cahaya Yatim Al Ikhlas Cibinong Foundation by 11.13. obtained a *p-value* of 0.000 (*p-value*< 0.05 at α = 5%), it can be concluded that there is a difference in knowledge about preventing T2DM in adolescents at the Cahaya Yatim Al Ikhlas Cibinong Foundation between before and after the FRESHIMA Facilitation program intervention.

Discussion

The FRESHIMA Facilitation Program is implemented using the FRESHIMA flip sheet educational media designed to increase knowledge in an effort to carry out T2DM prevention. The results showed an increase in score of 11.33 on the posttest with an average respondent score of 88.30 compared to the pretest score before the intervention of 77.17 and a *p-value* of 0.000 (*p-value* <0.05 at α = 5%), so it was concluded that there was a difference in knowledge about T2DM prevention in adolescent students at the Cahaya Yatim Al Ikhlas Cibinong Foundation before and after the FRESHIMA Facilitation program intervention. Through the implementation of FRESHIMA Facilitation, it is hoped that it can increase the knowledge and awareness of groups of adolescent students in carrying out T2DM prevention behavior, encouraging awareness of commitment to maintaining health quality.

FRESHIMA facilitation is an effort to prevent T2DM through health promotion and education activities is the first level of prevention (primary) as an effort to prevent disease through efforts to overcome and control risk factors based on the interaction relationship between the *host*, the cause (*agent*), the environment and the process of disease occurrence(17) . The effectiveness of facilitation in type 2 diabetes (T2DM) prevention knowledge improvement interventions is greatly influenced by the participatory learning approach that emphasizes the active involvement of participants in the learning process that allows dialogue, group discussion, and collective action so that participants not only passively receive information, but also internalize and apply prevention knowledge directly in their daily lives and increase internal motivation and deep understanding because the learning process takes place in a contextual and participatory manner. Recent studies have shown that interventions utilizing participatory facilitation contribute to changes in adolescents' health attitudes and behaviors, potentially reducing the risk of T2DM(18,19) . Therefore, participatory learning-based facilitation methods are a crucial strategy in designing effective T2DM knowledge improvement and prevention interventions in adolescents .(20–22)

In the FRESHIMA program, the material is delivered through a facilitation method with media designed to be an instrument in participatory learning that encourages participants to play an active role in the learning process with a discussion approach, simulations and practical activities that encourage understanding and increase motivation to implement health behaviors. This finding is in line with the research of Johnson, K., et al. (2020) which shows that the implementation of community-based T2DM prevention programs is effective in reducing the incidence of T2DM and improving the quality of life of productive communities. Another study conducted in 2019 by unnamed researchers, titled "*Nutritional Education and Prevention of Type 2 Diabetes in Working Adults*", also showed that regular nutrition education is highly effective in improving healthy eating patterns and reducing the risk of T2DM among *working* adults. Intervention programs are also expected to be designed to be age-appropriate and culturally relevant in terms of DM prevention behaviors including nutrition, physical activity and self-monitoring techniques(23) . Involving social integration through program design that fosters social connections with group activities in artistic, sports, dance, intellectual, etc. is considered to be able to help develop social skills and emotional resilience that encourage motivation for increased

formation of personal qualities in children needed to prevent to manage disease and maintain psychological well-being. Innovative approaches for teaching, adapting and inclusion of children with diabetes in society, for example the social health and education program "Diabetes, Dances, Children" has been implemented since 2020 in Moscow . (24)

As a sustainable effort, it is necessary to develop T2DM prevention intervention programs for adolescents through various efforts such as: (1) Collaboration between related parties such as schools, health centers, and communities to organize integrated health education programs, (2) Advocacy efforts for the use of FRESHIMA instruments and media facilitation as interactive educational media to health workers at the Puskesmas or Health Office, (3) Implementation of program development and FRESHIMA instrument media tailored to the characteristics of adolescents and the development of up-to-date information and data and (4) Implementation of regular monitoring and evaluation of the implemented prevention program to determine the level of effectiveness. With the implementation of an appropriate and integrated Diabetes Mellitus prevention program, it is expected to increase public awareness and knowledge, especially adolescents, in preventing diseases that can interfere with quality of life. In addition, it is also expected that there will be support from various parties to support health programs that aim to create a healthy and productive society.

Conclusion

Interventions to increase adolescents' knowledge of T2DM prevention in adolescent students at the Cahaya Yatim Al-Ikhlas Foundation were carried out using the facilitation method using the FRESHIMA flip sheet educational media designed to increase knowledge in efforts to carry out T2DM prevention. The results showed an increase in score of 11.33 on the posttest with an average respondent score of 88.30 compared to the pretest score before the intervention of 77.17 and a known *p-value* of 0.000 (*p-value* <0.05 at α = 5%), so it was concluded that the FRESHIMA Facilitation program intervention was effective in increasing knowledge about T2DM prevention behavior in adolescent students at the Cahaya Yatim Al-Ikhlas Foundation. This effectiveness is influenced by a participatory learning approach that emphasizes the active involvement of participants in the learning process which allows dialogue, group discussion, and joint action so that participants do not only receive information passively so as to motivate adolescents to apply it in their daily health behavior. Efforts to develop and utilize the FRESHIMA program can be carried out through increased involvement and interprofessional collaboration between academics, health workers and health service units and other related units so as to expand the scope of intervention implementation in efforts to increase knowledge and prevention of T2DM in adolescents.

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