



Potential for Rehabilitation Management Utilizing A Theory of Planned Behavior Approach Via Telehealth in Home Treatment-Based Diabetes Management: A Literature Review

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A B S T R A C T

Diabetes Mellitus is a metabolic disorder characterized by insufficient insulin production or ineffective utilization of insulin, resulting in elevated blood glucose levels. The prevalence of Diabetes Mellitus continues to rise annually, highlighting the urgent issue of inadequate blood sugar control among diabetic patients. Ineffective management of blood glucose levels poses significant risks for complications and adversely affects the quality of life of individuals with diabetes. This article employs a literature review methodology to explore the potential of rehabilitation management for diabetic patients. A comprehensive literature search was conducted across various databases, including Google Scholar, Science Direct, PubMed, and ProQuest. The search utilized keywords such as "Diabetes Mellitus," "Theory of Planned Behavior," "Rehabilitation of Diabetic Patients," and "Telehealth." The inclusion criteria encompassed publications in both Indonesian and English languages from 2016 to 2021. Eligible publications were identified and analyzed using the PRISMA method for synthesis. Rehabilitation interventions for diabetic patients focus on utilizing resources available within the home environment. These interventions have demonstrated a significant impact on various aspects of lifestyle, including physical activity, medication adherence, health education, and psychological support. Furthermore, telehealth has emerged as an effective medium for delivering remote health interventions, facilitating improved patient engagement and outcomes. In the context of the Social 5.0 era, telehealth presents a promising alternative for home-based rehabilitation of diabetic patients. By leveraging patient resources, telehealth can enhance the effectiveness of diabetes rehabilitation care and improve overall health outcomes for individuals living with diabetes.

INTRODUCTION

Diabetes is a chronic illness defined by either insufficient insulin production by the pancreas or inefficient insulin uses by the body (International Diabetes Federation [IDF], 2020). Diabetes is a chronic illness that needs lifetime care and significantly reduces an individual's productivity at work (Syatriani, 2023). Diabetes patients often experience a range of health issues, including discomfort, anxiety, sadness, sleep difficulties, low energy, and limited mobility, all of which lower their overall quality of life. Maintaining appropriate blood sugar levels is a crucial problem that requires attention from healthcare providers, patients, and their families.

Even after their blood sugar levels return to normal, diabetics still struggle with several health issues. Anxiety and sadness are common psychological problems that may prevent patients from maintaining appropriate blood sugar levels. Furthermore, several studies show that individuals with diabetes often lose a large amount of weight (Syamsiyah, 2022). In line with the aims of Sustainable Development Goal

(SDG) 3, successful blood sugar control and rehabilitation need ongoing monitoring and assistance from healthcare experts.

Diabetes mellitus has become a major global health concern due to its rising incidence in Indonesia as well as other countries. Globally, 537 million people (9.3% of the population) had diabetes in 2021; by 2030, that number is expected to rise to 575 million (10.2%) and 700 million (10.9%) by 2045 (IDF, 2023). 6.7 million fatalities worldwide were attributed to diabetes in the same year. Unbelievably, Indonesia has the seventh-highest number of diabetes patients worldwide in 2015; by 2040, it is predicted to move up to sixth position (Laili, 2022). The Indonesian government must give diabetes a high priority considering these figures.

Numerous health apps have been created in response to the rising incidence of diabetes to help individuals manage their disease. In addition, we are moving from the Fourth Industrial Revolution to the Society 5.0 age, which is defined by an increased emphasis on digital technology (Sudipa et al., 2023). Many diabetic programs already in use, however, have drawbacks. For example, Diabetes Checker does not have a particular theoretical foundation or interaction with healthcare services; instead, it focuses mainly on diabetes monitoring. Similarly, Track3-Diabetes Planner is a diabetes patient's companion app but is not integrated with other healthcare services. Considering these drawbacks, this research aims to assess the efficacy of telehealth treatments based on the Theory of Planned Behaviour.

METHOD

The method for writing this article is employing a literature review appropriate to the topic used as a reference for discussion. The literature used is articles obtained from electronic media using the keywords Diabetes mellitus, Rehabilitation of Diabetic Patients, Telehealth, and articles obtained through search sites such as Google Scholar, Science Direct, and NCBI. As well as books relevant to the topic.

Eligibility Criteria

The criteria used in the search were Indonesian and English, with publications from 2018 to 2023 for journals and textbooks from 2013 to 2023. The literature collected according to the criteria will be analyzed and synthesized by categorizing it into problem analysis and potential problem solutions until ideas emerge based on scientific evidence and supported by previous research. The PICO method was used to determine the articles to be analyzed.

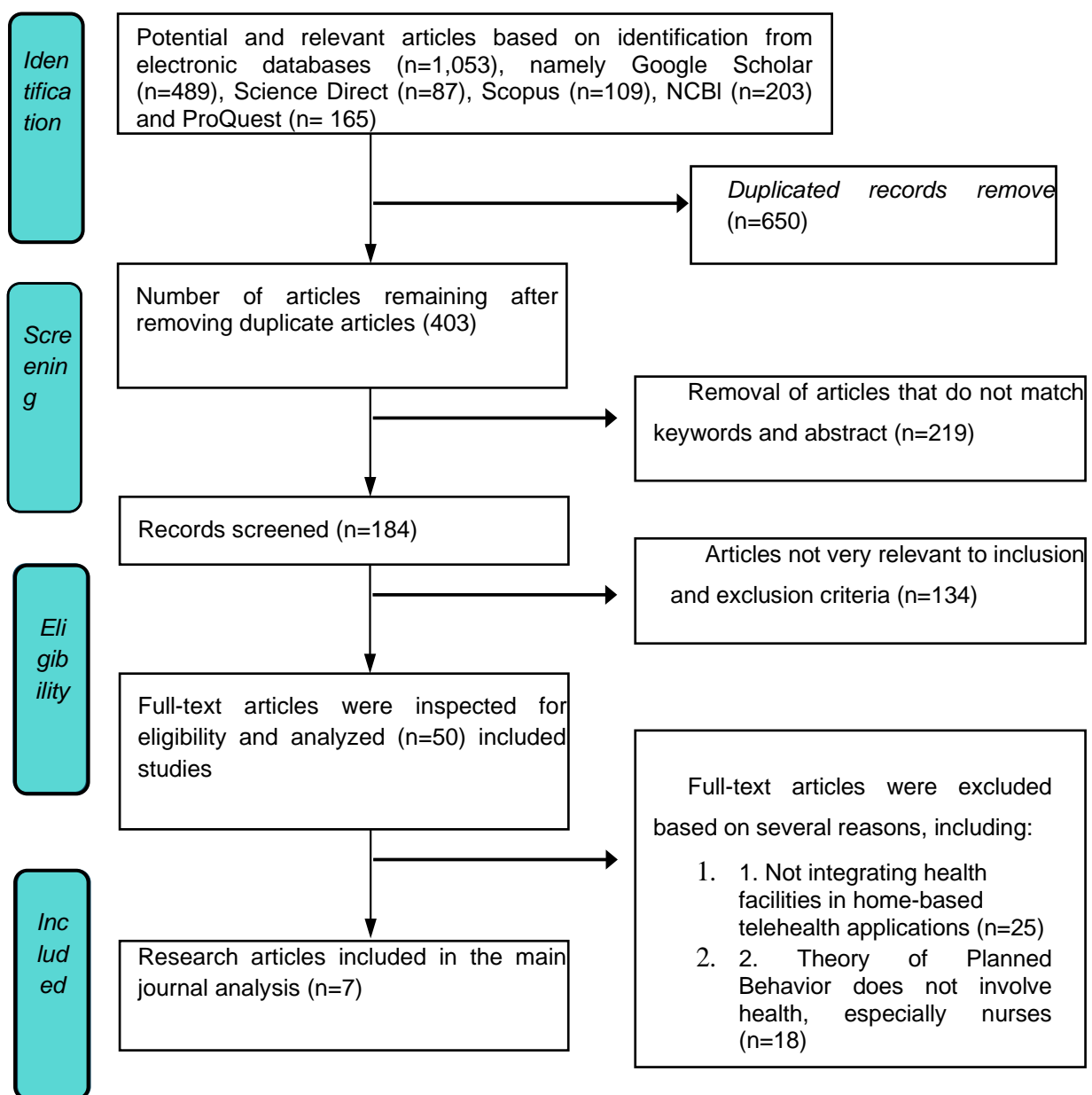
Tabel 1. PICO

Analysis	Contents
Problem/Population	Manajemen kadar gula darah penderita diabetes dan rehabilitasi
Intervention	Theory of Planned Behavior (TPB)
Comparison	Telehealth, Mhealth, Telenursing
Outcome	Membantu dalam manajemen gula darah dan rehabilitasi penderita diabetes di rumah

Data Selection

Potential and relevant articles based on identification of electronic databases (n=1,053) were Google Scholar (n=589), Science Direct (n=92), Scopus (n=104), NCBI (n=103) and ProQuest (n= 165). Duplicate data were removed (n=650). Articles that did not match the keywords and abstract were removed (n=219). Articles that were less relevant to the inclusion and exclusion criteria (n=134). Full-text articles were checked for eligibility and analyzed (n=50). Full-text articles were excluded for several reasons, including 1) Not relevant to diabetes problems (n=36), and 2) Theory of Planned Behavior is not (n=8). Research articles included in the primary analysis of journals (n=6). Using the PRISMA diagram, there are 6 articles analyzed in Table 2 Article Analysis.

Figure 1. PRISMA Diagram



RESULT

Table 2. Analysis Journal

Author & Year	Title	Country	Respondents	Method	Result
Zeidi et al (2020)	A theory of planned behavior-enhanced intervention to promote health literacy and self-care behaviors of type 2 diabetic patients	Iran	166 respondents	Randomized Controlled Trial	The application of TPB-based education is recommended to maintain and improve self-care behavior and health literacy in patients with type 2 diabetes and other chronic diseases.
Hosseini et al (2021)	The effect of educational program based on theory of planned behavior on promoting retinopathy preventive behaviors in patients with type 2 diabetes: RCT	Iran	94 respondents	Randomized Controlled Trial	The application of the TPB model has proven to be very effective in developing educational programs for diabetes patients, to control their blood sugar and improve retinopathy prevention behavior.
Sakitri & Astuti, (2020)	Strategi Kontrol Gula Darah dengan Theory of Planned Behaviour pada pasien Diabetes Mellitus tipe 2 di Puskesmas Stabelan	Indonesia	73 respondents	Quasy Eksperimen	There are differences in changes in blood sugar levels before and after intervention with the Theory of Planned Behavior through lifestyle modification by adjusting food, physical exercise or physical activity training, changes in risk behavior for smoking and alcohol consumption and DM patients need assistance.
Hsu et al (2023)	Applying the theory of planned behavior to investigate type 2 diabetes patients' intention to receive injection therapy	China	254 respondents	Cross Sectional	Attitude and PBC towards injection therapy have a positive and significant effect on the patient's intention to use injection therapy.
wahyu Lestarina (2018)	Theory of Planned Behavior sebagai Upaya Peningkatan Kepatuhan pada Klien Diabetes Melitus	Indonesia	100 respondents	Cross Sectional	The implementation of TPB-based education has an influence on compliance with a t-statistic value of 7.80 and Compliance has an influence on blood sugar levels with a t-statistic value of 4.592
Yang et al (2020)	Effect of a Mobile Phone-Based Glucose-Monitoring and Feedback System for Type 2 Diabetes Management in Multiple Primary Care Clinic Settings: Cluster Randomized Controlled Trial	Korea Selatan	247 respondents	Randomized Controlled Trial	Mobile-based glucose monitoring and feedback systems are effective, and they can be utilized effectively with a variety of institutions and patients.
Myers et al (2021)	Telemedicine for Disparity Patients With Diabetes: The Feasibility of Utilizing Telehealth in the Management of Uncontrolled Type 2 Diabetes in Black and Hispanic Disparity Patients; A Pilot Study	Amerika	30 respondents	Randomized Controlled Trial	Enhancing care as usual with telehealth delivered via telephone or tablet may be beneficial in improving glycemic control in NHB and H/L with type 2 diabetes.

Development Trends of Diabetes and Technology

In the current era of globalization, technological development is growing the faster we enter the era of society 5.0, this can become opportunities to develop internet connectivity and applications according to needs public health This is supported by the growth of internet users in Indonesia it increased to 171.17 million, which is the number Internet users amount to 64.8% of the total population of Indonesia (Mudawamah, 2020). Based on the percentage of the population who use internet based on age 19-34 is 74.23% and at age 35-54 years is 44.06%. Percentage of internet users by level the economic level in the lower social class is 58.55% and in the middle class 82.95%. In terms of application, internet use in the health sector, 51.06% of people search for health information on the internet, and 14.05% use the internet to consult a health professional. This figure may increase over time the passage of time, considering the sophistication of today's digital era (Association Indonesian Internet Service Provider, 2017).

DISCUSSION

1. The Effectiveness of Telehealth Utilization in Minimizing Stunting Rates

Recent technological developments have had a big influence on many industries, including healthcare. Healthcare services are now more effective and efficient due to these advancements. Technology is advancing faster in the contemporary globalized period, signaling the shift to Society 5.0. This development offers a special chance to provide internet access and apps suited to public health requirements. This trend is further supported by the increasing number of internet users in Indonesia, which reached 171.17 million in 2020, accounting for 64.8% of the country's total population (Palinggi & Limbongan). Diabetes management and preventive concerns may be successfully addressed by using this vast digital ecosystem.

2. Rehabilitation Management for Diabetes Mellitus Patients Based on Home Care

For individuals with diabetes mellitus, home-based care rehabilitation is essential for maximizing metabolic control, enhancing the quality of life, and averting both acute and long-term problems. Normalizing insulin activity and maintaining steady blood glucose levels are the major objectives. An emphasis on the patient's objectives and behaviors is necessary for effective rehabilitation. One essential element is nutritional management, which controls and limits the amount of carbohydrates consumed to avoid overtaxing the body's systems for controlling blood sugar. This entails planning meals, choosing the right foods, and figuring out how many calories you need (Alfi et al., 2019). Patients have a far better chance of effectively treating their diabetes when they practice proper dietary management. Appropriate serving sizes, consistent meal schedules, and thoughtful food category selection are essential components of a diabetic diet (Hestiana, 2017).

Furthermore, it is critical to motivate patients to participate in physical activities like exercise by assisting in creating exercise regimens, scheduling workouts, and encouraging them to establish enduring commitments. Exercise increases the muscles' ability to absorb glucose, which lowers blood sugar levels. Moreover, family members and close relatives must actively participate in home-based care rehabilitation by monitoring and supervising the patients' everyday activities. The effective treatment of diabetes requires this kind of group assistance.

3. The Potential of Telehealth in Diabetes Mellitus Rehabilitation

Research conducted by Alromaihi et al (2020) states that around 1351 (86.5%) patients have used telemedicine methods to receive diabetes mellitus treatment services. This indicates great potential for telehealth innovation demonstrated in self-care for diabetes mellitus patients. The potential use of telehealth in rehabilitating diabetes mellitus patients has positive impacts according to Warsito (2018), including increased patient knowledge showing that the level of patient knowledge about self-management of diabetes in the community environment increased by 80%, improvement in patient's ability to cope with problems indicating that type 2 diabetes mellitus patients who engage in self-management are able to proactively improve their abilities, and changes in patient behavior indicating that many patients engaging in self-management are able to change their healthy lifestyle behaviors such as exercising, relaxing, etc.

The planned behavior theory implementation with telehealth concepts is highly suitable as an extension of hospitals aimed at diabetes patients as a home-based rehabilitation program that collaborates with various health fields in its implementation process. The features in this application focus on rehabilitating diabetes patients by increasing compliance with blood sugar control using the Theory of Planned Behavior approach where the components of the Theory of Planned Behavior will be implemented in the features of this application. This application will help diabetes patients improve their quality of life. Interventions developed in this application may include client data assessment for 1 month which will be submitted to the related hospital for evaluation and comparison with the previous month. The following are the components of home-based diabetes rehabilitation:

1) Diabetes Education, Family Empowerment, Goal Planning

Diabetes patients in their efforts to improve their quality of life are supported by good levels of knowledge, support, and good life planning. With interventions in these three aspects, the goal of TPB as a theory focusing on changing the behavior of diabetes patients from maladaptive behavior to adaptive behavior will be achieved. Education will increase literacy, where application users will understand the negative impact of not maintaining normal blood sugar levels and the positive impact of maintaining blood sugar levels. This aligns with the Behavioral Belief component of the Theory of Planned Behavior.

Continuous support from loved ones can take the form of conversations, voices, and even videos with the hope that this support will serve as a reminder that they need to move forward, where this intervention is the implementation of Normative Belief. After receiving support, the last thing to do is to plan steps and future goals. In the telehealth concept, visitors can write their life plans that they want to achieve later. in line with the Control Belief component of the Theory of Planned Behavior.

2) Consultation and Learning from Other Patients' Experiences

Diabetes patients need to have access to reliable information, and it's better if obtained directly from healthcare providers. Additionally, the learning process emphasizing experience, according to several studies, is very effective both physically and psychologically. So, the combination of these two types of interventions will greatly assist in the rehabilitation process of diabetes patients.

3) Exercise, Healthy Eating, and Blood Sugar Management

This intervention presents several types of exercises suitable for Diabetes Mellitus patients. Then patients can choose the type of exercise they want to do, equipped with a timer suitable for the condition of Diabetes Mellitus patients. This is followed by the Healthy Eating intervention, the second which focuses on managing the food and beverage intake that will be consumed by Diabetes Mellitus patients. In this intervention, a bar menu is provided, namely breakfast, lunch, dinner, and snacks. Patients will manage their own food and drink consumption by considering sugar content through this feature. Furthermore, the third intervention is Blood Sugar Management, in this feature there is a score that will be given to patients regarding the blood sugar value on the examination day, then blood sugar development will be automatically recorded in the application as progress data. In conducting this therapy, the goal is to increase patient independence and compliance in the rehabilitation of their Diabetes Mellitus condition.

4. Implementation of Application Program as an Effort for the Digitalization of FCEM

The implementation of this application program is carried out using the Multimedia Development Life Cycle (MDLC) method, which begins with the concept stage, involving formulating the foundation of the project, its objectives, and the type of application to be developed. Subsequently, the design phase encompasses specifying the program's architecture, style, display, and material requirements. The third stage involves obtaining content material, where the collection of necessary materials or content for the application is conducted. The fourth stage, assembly, represents the production phase and requires IT expertise. After the production phase, the testing stage is conducted by applying the application on a minor scale to assess its feasibility before mass implementation. The final stage, distribution, involves disseminating the results to the target audience after confirming the application's suitability for mass implementation.

CONCLUSION

The evaluation of low compliance among diabetes patients in managing their blood sugar levels indicates the need to enhance their functional capacity and rehabilitation by applying the Theory of Planned Behavior (TPB) approach. Integrating telehealth with the TPB framework offers various intervention strategies aimed at improving the rehabilitation management of diabetes patients. This approach emphasizes the importance of addressing physical, psychological, and social functions, ultimately striving to restore physical and psychological capabilities to their highest level of independent functioning. The combination of telehealth and the TPB approach has proven successful in minimizing various challenges faced by patients, including reducing time commitments, transportation needs, costs, and potential health risks associated with traditional in-person healthcare visits. This innovative model not only facilitates better health outcomes but also promotes a more accessible and sustainable method of diabetes management.

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