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RESEARCH ARTICLE

# Effect of Self Efficacy Training on Diet and Blood Glucose Compliance in Diabetes Type 2 Mellitus Patients

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## Abstract

Background: Self-efficacy training is an effective way for people with diabetes mellitus to get improved blood glucose compliance and control. The purpose of this study was to analyze the effect of self-efficacy training on diet compliance and blood glucose. Methods: This study used a quasi-experimental pre-post-test with a control group. The population of this study was all Diabetes Mellitus patients in the Public Health Center area with 17 sample respondents for each group. The sampling technique was purposive sampling. The variables of this study were: self-efficacy training, diet compliance, and blood glucose. The way to collect data was by using questionnaires and laboratory examinations. Result: The results showed that self efficacy training did not affect the adherence of diabetic patients in either the intervention group or the control group with the Wilcoxon test results showing the intervention group ($p = 0.863$ ($p < 0.05$)), the control group ($p = 0.677$ ($p < 0.05$)) and the Mann-Whitney test ($p = 0.909$ ($p > 0.05$)). The second result showed that self-efficacy training had an effect on blood glucose in patients with Diabetes Mellitus in the intervention group but did not affect the control group, according to the Wilcoxon test results showed for the intervention group ($p = 0.003$ ($p < 0.05$), the control group ($p = 0.163$ ($p > 0.05$) and the Mann-Whitney test ($p = 0.080$ ($p > 0.05$). Discussion: self-efficacy training can improve blood glucose control quite well, but still requires integration with other components related to the pillars of Diabetes Mellitus management. Self-efficacy training is not significant enough to improve the adherence of diabetic patients but with increased knowledge and behavior, it is hoped that they will be able to increase their motivation to support increased self-care abilities, change behavior and carry out activities to maintain glycemic control.

**Keyword**: *Self Efficacy Training, Diet Compliance, Blood Glucose, Glycemic Control, Diabetes Mellitus.*

## Introduction

Diabetes has a major influence on the lives of individuals with diabetes, their families, and health care systems [1, 2]. The activities of care and treatment of Diabetes Mellitus sufferers who demand routine, long term health are very risky for boredom, boredom and eventually drop out, and this activity requires a lot of money when boredom occurs and the intention to violate compliance occurs and intention arises.

Violating compliance, self-awareness must be raised that the consequences will be more dangerous and detrimental to themselves and their families [3]. International Diabetes Federation (IDF) calculates the incidence of Diabetes Mellitus in the world in 2012 was 371 million, in 2013 it increased to 382 million and it is estimated that in 2035 Diabetes Mellitus sufferers will increase to 592 million. Based on data from the Jombang district health office, the number of people with Diabetes Mellitus in 2014 was 21.9% [4]. The results of preliminary studies in Bulurejo Village, Public Health Center Working Area showed that of the 10 patients, 71% of them stated that the results of fasting glucose levels and their random glucose levels were still up and down or were unstable, often increasing.

The results of the study also found that sufferers did not understand the proper diet related to the disease and lack of nurse education. The glycemic controlled condition was bad according to nurses because of the self-efficacy factor in patients who were not good.

This was also supported by the statement of nurses at the health center stating that the problem of Diabetes Mellitus patients was the problem of glycemic control which was still poor and in addition to diet, the problem of self-care and exercise or exercise carried out by patients was still not good [1]. One of the pillars of managing Diabetes Mellitus is education [5]. An effective method is needed in providing education to Diabetes Mellitus patients and teaching skills related to self-management which results in long-term improvements in the health of Diabetes Mellitus patients [6].

Giving information to patients related to disease through Self-efficacy training can improve patient knowledge. Self-efficacy training is the implementation of health education that focuses on four sources of self-efficacy, there is four sources of self-efficacy must be explored and optimized to improve patient self-management, namely experience of success, the experience of others (role modeling), social persuasion and psychological conditions [7].

Based on these four sources, in the implementation of self-efficacy training nurses not only provide health education to patients but also help sufferers to identify successful strategies that can help them to manage previous health conditions, identify and observe other patients as role models who succeed in controlling their condition and increase the self-confidence of patients to be able to do self-management and eliminate fear and anxiety [8].

The experience of the success of others (role models) is one source of information that can improve the self-efficacy of patients. The experience of the success of others who have similarities with individuals in doing a task will usually increase one's self-efficacy in doing the same task.

In this case, Diabetes Mellitus patients who have managed to live without complications during this time because of their adherence to the diet can be a role model for other Diabetes Mellitus patients. Self-efficacy training using role models is more effective in groups[9]. Running diabetes management independently with the correct understanding and high self-efficacy will support positive behavior and also impact on biological responses with a decrease in blood glucose, benefits, and functions of self-efficacy training are expected to be maximal for Diabetes Mellitus patients in improving dietary compliance and decreasing levels their blood glucose. The purpose of this study was to analyze the effect of self-efficacy training on diet compliance and blood glucose[6].

## Materials and Methods

This study uses the quasi-experimental design pre-post test with a control group design. The study population was all Diabetes Mellitus patients in the Public Health Center work area with a sample size of 17 respondents for the intervention group and 17 respondents for the control group. The sampling technique was purposive sampling.

The Independent variables of this study included self-efficacy training and the dependent variables were diet compliance and blood glucose. Diet compliance data collection using dietary compliance questionnaires and blood glucose using laboratory tests. The study was conducted after obtaining ethical approval with a registration number 003/KEPK/STIKESICME/IV/2019.

The process of data collection begins first by selecting prospective respondents and allowed to understand research. Filling out the questionnaire for the pre-test was done after the prospective respondents approved to the intervention group and the control group, the respondents then measured the blood glucose value accompanied by the family. Respondents from the next intervention group were given self-efficacy training interventions, while the controlled group respondents were not given self-efficacy training by researchers but still received education from the health center medical team as well as the intervention group.

The intervention was given for 4 weeks with each week self-efficacy training done 3 times and after the intervention period had been completed, the researcher conducted a post-test for both the intervention group and the controlled group by filling out the questionnaire, the respondents then measured blood glucose values. The collected data was then processed by the researcher and analyzed for the results and conclusions of the studied using the Wilcoxon test and Mann-Whitney test.

 

## Result

The results of the study of the effect of self-efficacy training on diet and blood glucose adherence of type 2 diabetes mellitus patients collected data including general data such as age, duration of suffering and education.

**Table 1: Characteristic Distribution of Respondents Research Effect of Self Efficacy Training on Compliance with Dietary and Blood Glucose Patients with Type 2 Diabetes Mellitus**

| Characteristics of Respondents | Intervention group | | Control group | | Total | |
|---|---|---|---|---|---|---|
| | Total | % | Total | % | Total | % |
| Age | | | | | | |
| <45 years | - | 0% | 0 | 0% | 0 | 0% |
| 45-59 years | 3 | 17.6% | 12 | 70.6% | 15 | 44.1% |
| 60-70 years | 14 | 82.4% | 5 | 29.4% | 19 | 55.9% |
| Total | 17 | 100% | 17 | 100% | 34 | 100% |
| Long-suffering from Diabetes Mellitus | | | | | | |
| <3 years | - | 0% | - | 0% | 0 | 0% |
| 3-5 years | 9 | 52.9% | 5 | 29.4% | 14 | 41.2% |
| >5 years | 8 | 47.1% | 12 | 70.6% | 20 | 58.8% |
| Total | 17 | 100% | 17 | 100% | 34 | 100% |
| Education | | | | | | |
| Elementary School | 12 | 70.6% | 12 | 70.6% | 24 | 70.6% |
| Yunior High School | 4 | 23.5% | 5 | 29.4% | 9 | 26.5% |
| Senior High School | - | 0% | - | 0% | 0 | 0% |
| Diploma/Bachelor Degree | 1 | 5.9% | - | 0% | 1 | 2.9% |
| Total | 17 | 100% | 17 | 100% | 34 | 100% |

The age of the respondents based on table 1 is known that in the intervention group almost all of them were in the age range of 60-70 years which was equal to 82.4%, while in the control group the majority of respondents had an age range between 60-70 years which was 12 respondents or 70, 6%. The majority of respondents in the study had suffered from Diabetes Mellitus in the range of 3 to 5 years, namely 52.9% in the intervention group, while in the control group most had suffered Diabetes Mellitus for more than 5 years, namely as many as 12 respondents or by 70.6%. The education of the research respondents in the intervention group was a mostly elementary school which was as much as 70.6% and in the control group, most of them had education levels as well as an elementary school which amounted to 70.6% (Table 1)

**Table 2: Distribution of Respondents' Dietary Compliance and Glucose Levels**

| Obedience | Pre Test Interventions | | Post Test Interventions | | Pre Test Control | | Post Test Control | |
|---|---|---|---|---|---|---|---|---|
| | ∑ | % | ∑ | % | ∑ | % | ∑ | % |
| **Dietary Compliance** | | | | | | | | |
| Obey | 7 | 41.2% | 8 | 47.1% | 4 | 23.5% | 4 | 23.5% |
| Disobedient | 10 | 58.8% | 9 | 52.9% | 13 | 76.5% | 13 | 76.5% |
| Total | 17 | 100% | 17 | 100% | 17 | 100% | 17 | 100% |
| Statistic analysis | Wilcoxon (p=0,863) | | | | Wilcoxon (p=0,677) | | | |
| | Mann-Whitney (p=0,909) | | | | | | | |
| **Glucose Levels** | | | | | | | | |
| Bad | 14 | 82,4% | 13 | 76,5% | 15 | 88,2% | 14 | 82,4% |
| Moderate | 3 | 17,6% | 4 | 23,5% | 2 | 11,8% | 3 | 17,6% |
| Total | 17 | 100% | 17 | 100% | 17 | 100% | 17 | 100% |
| Statistic analysis | Wilcoxon (p=0,003) | | | | Wilcoxon (p=0,163) | | | |
| | Mann-Whitney (p=0,080) | | | | | | | |

## Dietary Compliance

Compliance with diabetic patient's diet in this study by following in Table 2 shows that most respondents in the intervention group before the intervention (pre-test) research is having diet compliance with non-adherent category as much as 10 respondents or 58.8% and after the intervention (post) decreased to 52.9%.

The results of the study in the control group found that most of the respondents before the intervention (pre-test) had dietary compliance with the non-adherent category and after the intervention (post-test) also remained at the level of having diet compliance with the non-adherent category of 76.5% or as many as 13 respondents. The results of the statistical analysis with the Wilcoxon test showed that the intervention and control groups were p = 0.0863 and p= 0.677 (p> 0.05), which meant there were no differences in dietary compliance in the respondents in both the intervention and control groups before and after research.

The results of the statistical analysis with Mann Whitney's test also obtained p = 0.909 (p> 0.05) which means there was no difference in dietary compliance of the respondents of the study between the intervention group and the control group.

 

### Glucose Levels

The blood glucose level of Diabetes M patients in this study by following table 2 shows that almost all respondents in the intervention group before the intervention (pre-test) of the study were having poor blood glucose levels as many as 14 respondents or 82.4% and after the intervention (post-test) decreased to 76.5%. The results of the study in the control group found that almost all respondents before the intervention (pre-test) had a poor blood glucose level of 88.2% and after the intervention (post-test) decreased but almost all respondents still had poor blood glucose levels, namely amounting to 82.4% or as many as 14 respondents.

The results of the statistical analysis with the Wilcoxon test showed that the intervention and control groups were p = 0.003 and p = 0.163, which meant there were differences in blood glucose levels in the respondents in the intervention group and vice versa in the control group. Before and after research. The results of statistical analysis with Mann Whitney's test also obtained a value of p = 0.090 (p> 0.05) which means that there were no differences in blood glucose levels between respondents in the intervention group and the control group.

## Discussion

### Self-efficacy Training on Adherence to Diabetic Patients with Diabetes Mellitus

Compliance with diabetic patients' diets in this study generally indicates a change, where the results of the research in the intervention group showed an increase in the number of research respondents who had better dietary adherence or obedient categories, indicated by the percentage value of dietary compliance which showed improvement when post-test.

The value of diet adherence based on the analysis shows that the respondents in the intervention group before the intervention (post-test) mostly had dietary compliance with the non-adherent category and after the intervention (post-test) most remained at the level of adherence to the adherent category but general shows that changes are better, as indicated by statistical analysis which shows that 8 respondents experienced positive changes and 2 respondents had fixed dietary compliance values.

The results also showed that in the control group the compliance of diabetic patients mostly before the intervention (pre-test) had dietary compliance with the non-adherent category and after the intervention (post-test) most had the same dietary adherence i.e. non-adherent category. Self-efficacy is a person's belief in success in self-care to achieve the desired results. The process of forming Self-efficacy is carried out through cognitive, motivational, affective and selection processes throughout life. The cognitive function allows individuals to predict everyday events that will have an impact on the future.

Individuals will predict events and develop ways to control events that affect their lives [10] Health education in self-efficacy training includes four components, namely experience of success, the experience of others (role modeling), social persuasion and psychological conditions.

Self-efficacy training is not just about giving knowledge to clients, because to increase compliance not only requires knowledge, but also motivation and self-management that are effective in dealing with problems [11]. According to researchers, the knowledge provided through education will change the mindset of people with Diabetes Mellitus so that they can increase knowledge about diabetes mellitus and management.

The intervention group experienced an increase in the value of adherence at the time of the the the post-test even though the improvement did not look significant. This is according to researchers because the respondents were able to respond well to the intervention provided, but the condition of poor glycemic control on the respondents gave a deterrent effect or became a bad experience for the respondents so that the increase did not look significant.

The results of the statistical analysis with the Wilcoxon test showed that the intervention and control groups did not differ in dietary adherence in the respondents in either the intervention or control groups from before and after the study. The results of the statistical analysis with Mann Whitney's test also showed that there was no difference in dietary compliance in the study respondents between the intervention group and the control group.

 

Knowledge of cognitive is a domain that is very important for the formation of a person's actions or behavior [12].

The patient's knowledge of diabetes mellitus is a tool that can help patients to manage diabetes during their lives so that more and more people understand the disease better understand how to change their behavior [13]. Education and training for people with Diabetes Mellitus is an education about knowledge and skills for people with Diabetes Mellitus to support behavior change, improve understanding of the disease so that optimal health is achieved, adjusting psychological conditions and improving quality of life [1].

According to the researchers, the absence of a significant difference in dietary compliance among respondents indicated that management in people with Diabetes Mellitus was not only focused on treatment, care or education but needed a comprehensive approach to meet complex needs for people with Diabetes Mellitus both physiological education and psychological support.

Based on the research data it is known that almost all respondents in both the intervention group and the control group had suffered Diabetes Mellitus for more than 3 years and almost all respondents were elderly. The length of a person having Diabetes Mellitus will affect their adaptation physiologically but does not affect their psychosocial adaptation, complications arising from Diabetes Mellitus will affect psychosocial adaptation and work and marriage stimuli will affect the physiological adaptation of the patient[14].

Aside from these factors which were not carried out statistical analysis in this study, researchers argued that although there was no significant difference as the results of statistical analysis related to dietary compliance, self-efficacy training was quite able to help individuals who had long suffered from Diabetes Mellitus in to improve dietary compliance. The duration or duration of suffering from Diabetes Mellitus according to the researchers also had a large influence on the experience of respondents about the disease, which ultimately affected their knowledge of the disease[15]

**Self-efficacy Training on Blood Glucose in People with Diabetes Mellitus**

Blood glucose levels of Diabetes Mellitus patients based on the results of the study revealed that almost all respondents in the intervention group before the intervention (pre-test) had bad blood glucose levels (82.4%) and after an intervention (post-test) decreased to become better even though most still had glucose levels bad blood (76.5%). The results of the study in the control group found that almost all respondents had poor blood glucose levels both before the intervention (pretest) and after the intervention (post-test).

Educational programs in Diabetes Mellitus patients are carried out in groups effective in controlling blood sugar levels, HBA1C, blood pressure, weight, treatment, and knowledge of diabetes [15, 16]. Poor control of glucose metabolism is characterized by increasing blood sugar levels or hyperglycemia [17]. According to researchers, the blood glucose levels of respondents with Diabetes Mellitus after being given self-efficacy training had a significant influence on blood glucose levels in Diabetes Mellitus patients, changes in knowledge and attitudes that occur after self-efficacy training would be more beneficial if the intervention was carried out intensively or longer and carried out individually or groups because the biggest change or contribution in controlling blood sugar levels lies in the behavior of the patient itself, whether obedient or not in the intervention or treatment provided by health workers.

The results of the statistical analysis showed that in the intervention group there were differences in the blood glucose of the respondents after the study, but in the control group there were no differences in blood glucose in the study respondents from before and after the study.

The results of the statistical analysis also compared between the intervention group and the control group where it was found that there was no difference in blood glucose between the study respondents in the intervention group and the control group. People with Diabetes Mellitus must get education about self-care because it is important to support self-care, their glycemic control and education is an important

 

element because it helps optimize blood glucose control to prevent complications [4, 18, 19].

This is also supported by the opinion of [20] which states that Diabetes Mellitus self-care is a process of developing knowledge or awareness to learn to survive the complex nature of Diabetes Mellitus and self-care in Diabetes Mellitus patients should be directed towards healthy, physically active, monitoring food behavior. Blood glucose levels, appropriate treatment, problem-solving with healthy coping, and risk-reducing behavior.

According to the researchers, the differences in the intervention group and the absence of differences in the control group showed that the process of adapting Diabetes Mellitus patients to their self-concept, the role, and dependence of Diabetes Mellitus patients showed that the condition of Diabetes Mellitus was a source of stimulus or stress which influenced physiological and psychosocial conditions.

In the intervention group, there was a change from pre to post, this shows that self-efficacy training has a strong influence in contributing to changes in respondents' physical adaptation responses to stressors. Self-management with diabetes education has been considered important in individual clinical management [21] as the results of this study show that the given intervention can control blood glucose in respondents for the better. Although no statistical analysis was conducted, from the research data it was found that almost all respondents were elderly. States that several factors can affect the glycemic control of Diabetes Mellitus patients such as type of diabetes, type of treatment, degree of control to be achieved, age of persons with diabetes, available facilities, knowledge, and motivation of people with Diabetes Mellitus [22].

The limitation of this study was the age factor in the intervention group and the control group also affected the condition of the respondent's blood glucose which did not change significantly because knowledge and attitudes were not directly related to health behavior but also other factors including personality systems, experience, customs held by the individual and the existence of supporting factors or conditions that allow such adequate facilities.

## Conclusions

Self-efficacy training is not enough to help people with diabetes mellitus improve their adherence to the diet. Self-efficacy training can help people with diabetes mellitus to control glucose levels quite well. Changes in glucose levels to be better can be achieved, one of which is education developed with the concept of self-efficacy training in Diabetes Mellitus patients.

Nurses need to optimize and participate in educational activities for people with diabetes mellitus such as the development of models and concepts of education with self-efficacy training to improve the adherence of diabetics to support glycemic control in people with diabetes mellitus to be more controlled.

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