THE EFFECTIVENESS OF COMBINATION OF YAM BEAN AND TOMATO JUICES AGAINTS SUGAR LEVELS OF DIABETICS MILITUS PATIENTS TYPE 2

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Abstract

Diabetics militus is a group of metabolic diseases with hyperglichemic that is caused by abnormality insulin secretion, insulin works, or both of them. One of alternative for decreasing sugar levels is yam bean and tomato juices consumption. The aim of the research is to exposed the influence of yam bean juice and tomato juice againts sugar levels of diabetics militus type 2. This research is experimental study with pretes-posttest with control group design. We used purposive sampling with 18 respondenses. The primary data are intake interview, IMT measurement, and blood sugar levels. And the secondary data are the data resources about diabetics militus. Data are analyzed statically by T-test two mean differences dependent and independent with error degree 5%. The result showed that the avarage of sugar blood levels before and after intervension respectively is 287,6 mg/dl and 220,8 mg/dl. There was the significant difference between blood sugar levels before and after group cases (p<0,05). The avarages of blood sugar levels before and after intervension on control's group respectively are 317,8 mg/dl and 331,9 mg/dl. There was no significant difference of blood sugar levels in the begining and final of control's group (p<0,05). There was an influence of yam bean juice and tomato juice supply againts blood sugar levels at a time (p<0,05). This study is expected to suggest the people with diabetes mellitus to consume yam bean and tomato juice as an alternative way to control or to decrease blood level sugar.

Keywords*: Yam bean and tomato juices, blood sugar levels, DM type 2*

INTRODUCTION

Non Infectious Disease (NID) is an cronic disease which is not infected by one to another. NID has long term and it evolved slowly. There are four kind of NID based on WHO. There are cardiovascular (coroner, stroke), cancer, cronic respiratory (athma, cronic obstruction lungs disease), and diabetes.[1]

Based on Internasional of Diabetic Ferderation (IDF, 2014), global prevalence levels of diabetes mellitus sufferers in 2014 is 8,3% from total population of the world with 387 million cases. Indonesia was in fifth position of diabetes mellitus sufferers with 9,1 million sufferers after China, India, USA, and Brazil. [2] The number of diabetes mellitus cases based on data Riskesdes (2013) was increased from 1,1 % in 2007 to 2,1 % in 2013.[1]

Prevalence of diabetes mellitus sufferers in West Sumatera was less than prevalence of national diabetes mellitus sufferers. However based on Riskesdas, this prevalence in 2013 was increased than 2007. The report of Riset Kesehatan Dasar (Riskesdas) in 2007 gave the data which are West Sumatera Province had prevalence of diabetes mellitus amounted to 1,2% whereas in 2013 the prevalence was increased to 1,9%.[1]

The data from Health Departement of Padang city said that the amount of diabetes mellitus case at Puskesmas Nanggalo in 2014 was 1389 people, in 2015 was 783 people, and until November 2016 was 878 people. The number of diabetes mellitus sufferers in Puskesmas Nanggalo in 2016 was increased than previous years.[3]

Diabetes mellitus is a group of metabolic disease with hyperglichemic characteristic. It is caused by abnormality insulin secretion, insulin works, or both of them.[4] However, the insulin is not only arranged the blood sugar levels, but also the other macro nutrient, including several hormones which is necessary to maintaining a balance the functioning of the body.[5]

The medication of diabetes mellitus was purposed to decreasing blood sugar levels, so thar the patients are not facing the complication. The treatment of diabetes mellitus can be applied by non-pharmacological such as diet and doing an exercise. Then, the treatment by pharmacological is using medicines. In addition, the alternative treatment, we can use herbs which are safe to consumed. [6] The herbs that can be use for diabetes mellitus sufferers are yam bean and tomato.

Yam bean *(Pachcrrhizux erosus)* are well-known in our society.[7] The part of tuber of yam bean containts sugar, starch, and oligosakarida which is known as inulin[8] Inulin is useful for decreasing glucosa levels of diabetes mellitus disease.[9]

The research that has be done by Nisa (2014) with giving yam bean extraction 175 ml (300 gr yam bean) for 7 consecutive days resulted the influence of yam bean extraction appropriations againts blood sugar levels a time diabetes mellitus sufferers. The avarages of decreasing blood sugar level a time obtained 65,3 mg/dl.[10]

Beside yam bean, another herb that can be used for diabetes mellitus sufferers is tomato. Tugiyono said that tomato containts a useful substances for human body. Some substances are contained in tomato are vitamin C, vitamin A (karoten), and mineral.[11] In addition, tomato also contain likopen as pigmen that give red to tomato color. There are several function of likopen for human health such as prevent prostat cancer, lungs, gastroduodenal, bone, cardiovascular disease, degenerative disease, indigestion, diarhea, catarac, and diabetes mellitus.[12]

The research result of Martha and Wirawanni (2015) showed that there is an influence between giving cucumber juice againts blood sugar levels with 200 ml that are cointain 100 gr cucumber and 100 gr tomato during 7 consecutive days. The decreasing of postprandial blood sugar levels was 3,32 mg/dl.[13]

The aim of this study is to observing the influence between giving yam bean and tomato juices againts blood sugar levels to diabetes mellitus type 2 sufferers.

METHODS

The design of this research is quasi experimental with pretes-posttest with control group design with yam bean and tomato 250 ml/day (100 gr yam bean and 100 gr tomatoes). This research was held on November 2016 until April 2017 in Puskesmas Nanggalo work region in Padang.

The population in this research is all diabetes mellitus type 2 sufferers in Puskesmas Nanggalo Padang work region with the amount 878 people. The sample is 18 diabetes mellitus patient which is taken by purposive sampling method. The inclution respondense criteria are the sufferers of diabetes mellitus type 2, consumer of medicine for decreasing blood sugar levels, people who could communicate, people who ≥ 45 years old, and people who are willing to consumes yam bean and tomato juices for 7 consecutive days, and people who are willing to be a responden with filling the informed concent. After getting 18 respondenses, we separated in to two groups, which are control's group and case's group. Case's group are give intervention with yam bean and tomato juices, whereas control's group are not,

Yam bean and tomato juices are given for 7 consecutive days and it is controlled by checklist. Yam beans that had been used are < 14 days after harvesting with medium size (1 kg = 4 – 5 yam beans), whereas tomatoes that had been used are red pulm tomato with medium size (1 kg = 10 tomatoes). The appropriation of yam bean and tomato juices are given directly by researchers to the respondense of case's group. Before an intervention is given, the researchers measure initial GDS, weight, and height of body. Besides, the researchers also filled identity responden form. During the experiment, the researchers did monitoring the intake of food for respective respondenses with food recall 2x24 hours method. It was been doing at the third day and seventh. At the seventh day, we measured the blood sugar level to respondenses of case and control group as final data.

Collecting data had been done by interview and examination. General data of respondenses are name, age, address, telephone number, type of medicine, period length of DM type 2 suffer had obtained by interview and quitioner of general data of respondense. Intake food data were obtained by food recall 24 hours interview. Weight data were gained by weighting the respondense with digital scale (accuration = 0,1 kg), whereas height of respondenses were measured with microtoise (accuration = 0,1 cm). Blood sugar levels initial and final were examined with blood gluco-test. These data were noted in general data of respondense.

Independent variable in this research is the consumption of yam bean and tomato juices. It is measured in mililiter (ml). Dependent variable is blood sugar levels in a time, and ambigous variable is intake food that contain an avarage of intake energy from food and

bevarage that was consumed during the intervention. Intake food data that was obtained by food recall 24 hours in household scale was coversed to gram, then we calculated the energi with nutrisurvey.

All obtained data were tested by normality test with *Shapiro Wilks* method. The differences of blood sugar levels a time in initial and the last of intervention were tested by t-test dependent. The influence of yam bean and tomato juices was analized with t-test independent with level of confidence 95%.

STUDY RESULT

Research Characteristic

This research has been done from November 2016 until April 2017 in Puskesmas Nanggalo Padang work region. Total respondences are 18 people, then we divided in to two group, 9 respondences of case group and 9 respondences of control group. The characteristic of respondence (gender, age, nutrient state, job, energy intake, and consumed medicine) of both of them can be seen in table 1.

Table 1. The Characteristic of Respondence

Variable	Group		Avarage
	Case	Control	
Gender			
- Male	66,7%	100%	83,3%
- Female	33,3%	0%	16,7%
Age			
- 45-54	55,6%	66,7%	66,7%
- 55-64	44,4%	33,3%	33,3%
Nutrient state			
- Undernourishment	0%	0%	0%
- Normal	55,6%	33,3%	44,4%
- Excess nutrients	44,4%	66,7%	55,6%
Job			
- Housewife	66,7%	100%	83,5%
- Civil servant	11,1%	0%	5,5%
- Security guard	11,1%	0%	5,5%
- Labour	11,1%	0%	5,5%
Energy intake			
- Less	22,2%	0%	11,1%
- Enough	55,6%	55,6%	55,6%
- Excess	22,2%	44,4%	33,3%
Consumed medicine			
- Metformin	88,9%	66,7%	77,8%
- Glukophage	11,1%	33,3%	22,2%

Table 1 showed the avarages of respondense such as gender, age of 45-54 years old, excess nutients, housewife, enough energy intake, medicine to decreasing blood sugar levels with metphormin and glucophage.

The differences between blood sugar levels a time in initial and final of case and control respondense

The differences between blood sugar levels a time in initial and final of case and control respondense can be seen in table 2.

Table 2. The avarage of Differences of Respondense Blood Sugar Levels a time

	Case			Control		
	Initial	Final	P	Awal	Akhir	P
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
GDS	287,6 ± 71,8	220,8 ± 74	0,006	317,8 ± 105	331,9 ± 87	0,142

The result of t-test dependent for case group showed that there is the differences between blood sugar levels a time (p=0,006) before and after intervention. Whereas for control group showed that there is no differences between blood sugar levels a time (p=0,142) before and after intervention.

The Effectiveness of Yam Bean and Tomato Juice againts Blood Sugar Levels of Diabetics Mellitus Type II Patients

The Effectiveness of Yam Bean and Tomato Juice againts Blood Sugar Levels of Diabetes Mellitus Type II Patients can be seen on table 3.

Table 3. The Effectiveness of Yam Bean and Tomato Juices againts Blood Sugar Levels a Time of Diabetics Mellitus Type 2 Patients

Statistical Analytic	Test	N	Mean	Standard Deviation	p	Relation
The average of decrasing GDS levels of Case Group	T	9	66,78	54,46	0,001	Meaningful
The average of decreasing GDS level of Control Group		9	-14,11	26,02		

Table 3 showed that there is an effect of yam bean and tamato juices againts blood sugar levels a time of diabetics mellitus type 2 sufferers (p=0,001).

DISCUSSION

The respondense of this research is diabetics mellitus type 2 that is located at Puskesmas Nanggalo work region. They consumed medicines of diabetics mellitus. They mostly consumed metphormin and glucophan (kind of medicines that have same function to reduce blood sugar levels).

After the research in 7 consecutive days has been done, the respondense's blood sugar levels of two groups had been change. Case group had been declined on blood pressure, whereas control group had been increased on blood sugar levels. Depend on the results, it is known that the blood sugar levels a time had been decreased with average 66,8 mg/dl. Whereas in control group, blood sugar levels a time had been increased at 14,1 mg/dl. Case group had decreased the blood sugar levels because they were not only consuming the medicine but also they were consuming yam bean and tomato juices during 7 consecutive days.

Depend on the research, it was not all respondense who had decrased the blood sugar levels. There was one respondense who had increased the blood sugar at 13 mg/dl. The blood sugar was increased because the respondense didn't have the willingness to control food intake with average of recall 133,65 % of needs. Whereas the increasing of the highest blood sugar levels for case group is 130 ml/dl. It because the respondenses could control food intake with average recall 93,01% of needs.

Based on the research, there is an increasing of blood sugar levels a time of control group with the average 14,1 mg/dl. It was happened because 22,2% of respondense had decreased the blood sugar levels and 77,8% of respondenses had increased the blood sugar levels.

In control group, there is two respondenses had decreased the blood sugar levels. The decrasing of blood sugar levels was expected because respondenses willings to control the food intake.

Total of energy intake from consumed food can affect blood sugar levels of diabetics mellitus sufferers. Based on Fitri and Wirawanni, the higher we consume foods with high energy, the higher blood sugar levels we get.[14]

Based on result of this research, it showed that $p < 0,05$ which is p=0,001, it means there is an effect of yam bean and tomato juices againt blood sugar levels of diabetics mellitus type 2 patients. This research has shown the difference between initial and final of

blood sugar levels a time after giving the yam bean and tomato juice. The differences is meaningful statistically. This research used 100 gr of yam beans and 100 gr tamatoes with the average of decreasing blood sugar levels 66,8 mg/dl.

Those statement are supported by another researh that has been done by Nisa (2014) with yam bean extracts amounted to 175 ml (300 gr yam beans). It had been done during 7 consecutive with the average of decreasing blood sugar levels a time 65,3 mg/dl.[10] The research by Kasmiyetti and Hermita (2015) showed that the giving of 200 gr yam beans for 7 consecutive days will decrease the blood sugar levels to 24,04 mg/dl. [15] The research by Rahmawati (2012) in Policlinic with specialize Cardio in RSUP Dr. M. Jamil Padang showed that the giving 175 ml of yam bean juices (100 gr yam beans) twice a day for 7 consecutive days will decrease the average of blood sugar levels a time to 4,75 mg/dl. [16]

Besides, the research by Martha and Wirawanni (2015) showed that the giving of cucumber and tomato juices with 200 ml which is come from 100 gr cucumber and 100 gr tomato in 7 consecutive days will decrease the average of blood sugar level with amounted 3,32 mg/dl. [13]

The cause declining of blood sugar levels was expected by insulin effect that is contained in yam bean and likopen effect that is contained in tomato. Inulin in colon will be fermented by *Bifidobacteria* and *Lactobacillus* that produce a short chain fatty acid (SCFA).[17] SCFA roles in increasing GLP-1 levels. GLP-1 hormone has significant role to stimulate pankreas β cell to produce insulin and directly stunted glucagon secretion so that the decreasing of blood sugar levels occur.[9] Besides that, fiber and inulin that are role as prebiotic caused food time transit become shorter and it makes you feel full longer so that the body produce glucose slower. [16] Inulin can control blood sugar levels to diabetics mellitus type 2 patients increase after eating. The declining plasma glucose caused by inulin will makes sugar levels better and it will help for diabetics treatment. [18]

In addition, likopen that is contained in tomato has the potential to prevent the increase of blood sugar levels. Lycopene is able to increase insulin receptor sensitivity which causes elevated blood glucose levels to be reduced to normal levels and is able to protect the pancreas from free radicals, so that the pancreas can work optimally in producing insulin.[19]

During the process of making yam and tomato juice, tomatoes are blanched first in hot water for 10 minutes. This aims to activate lycopene found in tomatoes. The heating process is not to produce more lycopene, but it is done to release lycopene from the tomato cell structure and convert the lycopene form from the *trans* to *cis* formula so it is easily absorbed by the body.[19]

Consuming foods containing inulin and lycopene for people with diabetes mellitus can help patients in lowering blood sugar levels. Combining these two substances is expected to cause insulin to work more effectively in lowering blood sugar levels of people with diabetes mellitus.

CONCLUTION

1. The average baseline blood glucose level in the case group was 287.6 mg / dl, whereas in the control group was 317.8 mg / dl
2. The average blood glucose level at end-time in the case group was 220.8 mg / dl, whereas in the control group was 331.9 mg / dl
3. There was a significant difference in blood glucose levels at baseline and end of case group (p <0.05) and there was no significant difference in baseline and late blood glucose levels (p> 0.05)
4. There is the influence of juvenile and tomato juice on blood glucose level (p <0,05)

SUGGESTION

1. It is expected that people with diabetes mellitus can continue the consumption of juice bengkuang and tomatoes as an alternative non pharmacological treatment to control or lower blood sugar levels.
2. To the next reader or researcher to further develop the research by adding other factors such as stress and physical activity that can affect blood sugar levels in people with diabetes mellitus.

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