

Lifestyle Identification and Random Blood Glucose Screening in Mulyorejo Public Health Center, Surabaya, Indonesia

Hariyono Hariyono^{1*}, Sri Pantja Madyawati^{1,2}, Shifa Fauziyah³, P Muthu⁴

¹ Postgraduate School, Universitas Airlangga, Surabaya, Indonesia

² Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia

³ Doctoral Program of Medical Science, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

⁴ Department of Biomedical Engineering, College of Engineering and Technology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India

Abstracts

Backgrounds: One of the non-communicable disease that still increase is Type 2 Diabetes Mellitus (T2DM). Of these, lifestyle pattern have been known as the risk factors. **Objectives:** This study aims to investigate lifestyle and conduct random blood glucose (RBG) screening in a community. **Methods:** Accidental sampling was conduct on November 12th to November 15th 2019 in Mulyorejo Public Health Center, Surabaya, Indonesia. Participants were investigate their lifestyle by self-questionnaire while RBG screening was done by using finger capillary test. Chi-square test was used to analyse the relationship between lifestyle and level of RBG. **Results:** The results shows that there's no lifestyle variables that shows significantly associated with the level of RBG. Family history shows ($p=0.15$; $p>0.05$), blood pressure ($p=0.91$; $p>0.05$); smoking ($p=0.26$; $p>0.05$); physical activity ($p=0.19$; $p>0.05$); vegetable consumption ($p=0.94$; $p>0.05$); and fruit consumption ($p=0.64$; $p>0.05$). **Conclusion:** Self-questionnaire to identify lifestyle pattern and also random blood glucose screening is well method for preventive way as an early warning of T2DM. This screening must be conduct regularly, so that everyone known its risk factor.

Keywords: Lifestyle, random blood glucose, screening, Surabaya

Introductions

The number of non-communicable disease in 21st century is still worsening, one of them was diabetes mellitus(1). Based on the aetiological, diabetes was classified into two groups, namely type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM). Diabetes mellitus define as chronic metabolic disorder that characterized by persistently hyperglycemia that caused by reduction of insulin secretion (type I diabetes mellitus/T2DM), insulin resistance (type I diabetes mellitus/T1DM), or both of them. Type II diabetes mellitus (T2DM) mainly caused by progressively failure of insulin secretion that can lead to inbalance of blood glucose(2). The failure of β pancreas to produce insulin can cause high level of blood glucose(3). International Diabetes Federation (IDF) estimated that as many as 415 millions of people affected by diabetes mellitus(4). In 2017, Indonesia reported 10.3 millions people affected by diabetes and places as the sixth country with the highest diabetes cases in the world(5) .

Diabetes mellitus is a results of the interaction between genetic, environment, and behavioural factors. Individual with T2DM more susceptible to have severe complications and can lead to the suddenly death(6) . World Health Organization (WHO) was classified the risk factors of T2DM, including age, obesity, and unhealthy lifestyle. Diabetes mellitus not only reported on elderly group, but also in young adults, especially caused by obesity as risk factor(2). Early prevention of diabetes mellitus was important in order to minimize economic cost or burden of disease. Diabetic screening has function to facilitated early detetction and treatment for asymptomatic diabetic patients. Twenty five percents of T2DM patients have microvascular complication after experienced the disease for five years In this case, early screening in patients with hyperglycemia could be important due to identifying high risk individu, so that complications can be prevented(7).

Variation method for diabetic screening have been identified. However, the using of 75 g oral glucose tolerance test (OGTT) is still a gold standar(8), but this method was costly and uncomfortable. Random capillary blood glucose (RBG) have been frequently used in clinical setting, because it provides more quick time and available results. Some meta analysis study reveals that early screening specifically in prediabetic person have strong efficacy to prevent T2DM onset(9) . People with normal glucose suggested to attend screening minimum one time in every three years(10) . In this study, we conduct random blood glucose screening and also identified lifestyle of the subject to figure out what's the point of their lifestyle that can lead to high level of their RBG.

Methods

Our study was used analytical observational and cross sectional design. We carried out public health center-based study among the visitor of Mulyorejo Public Health Center during November 12th to November 15th 2019. Researcher was give explanation to the visitor whom have willingness to participate in this study then signed informed consent. A number of 100 participants were joined this study. Structured questionnaire were adopted The Finnish Diabetest Risk Score (FINDRISC) with some modifications. Structured questionnaire consisting of sosiodemographic variables (age, gender, educational level, occupation, religion), clinical variables (blood pressure, body mass index, the occurrence of family history with DM, and the level of random blood glucose), behavioural variables (smoking, physical activity, vegetable consumption, fruit consumption).

Blood pressure was measured two times within measurement range is about 5 minutes, participants were seated and the measurement were done by qualified nurse using automated sphygmomanometer. Afterward, average of the value were recorded. Subject was categorized as hypertension if the average of blood pressure value shows $\geq 140/90$ mmHg. Participant was noted have smoking activity, if they spend one or more serving cigarette in every day. Vegetable and fruit intake the of participant was "Adequate" if they spend vegetable/fruit as many as five times in a week. Participant was noted as having adequate physical activity if they doing exercise at least 150 minutes per week or 30 minutes everyday. Afterward, data was analysed using chi-square test.

Results

a. Sociodemographic factors

A hundred of men (31) and women (69) were joined this screening. Based on the self-questionnaire, below are the characteristics of the subject. **Table 1** shows the distribution of sosiodemographic variabels of participants:

Table 1. Sociodemographic variables of participants of RBG's screening in Mulyorejo Public Health Center in 2019

Variable	Frequency	Percentage
Age		
17-25	6	6%
26-35	11	11%
36-45	18	18%
46-55	26	26%
56-65	22	22%
>65	17	17%
Gender		
Women	69	69%
Men	31	31%
Occupation		
Retired	11	11%
Enterpreur	40	40%
Army/Police	4	4%
Housewife	22	22%
Yet working	15	15%
Government	8	8%
Educational Level		

College graduate	26	26%
High school graduate	33	33%
Middle school graduate	11	11%
Elementary graduate	22	22%
Uneducated	8	8%
Religion		
Moslem	91	91%
Hindu	2	2%
Catholic	1	1%
Christian	6	6%

b. Clinical variables

Clinical variables in self-questionnaire consist of various point such as blood pressure value, level of RBG, body mass index, the occurrence of family history with DM, are they doing treatment of DM, and are they doing treatment of hypertension

Table 2. Clinical variables of participants of RBG's screening in Mulyorejo Public Health Center in 2019

Variable	Frequency	Percentage
Blood Pressure		
Normal	90	90%
Hypertension	10	10%
Level of RBG		
<200	89	89%
≥ 200	11	11%
Body Mass Index		
<25 kg/m ²	90	90%
≥25 kg/m ²	10	10%
Family history of DM		
Yes	27	27%
No	73	73%
Doing treatment of DM		
Ever	10	10%
Never	90	90%
Doing treatment of hypertension		
Ever	24	24%
Never	76	76%

Table 3. Chi-square test of some clinical variables and behavioural variables

Variable	High Level of RBG(≥200 mg/dL)		p	OR
	Yes	No		
Family History			0.15	2.53 (0.7 < OR < 9.13)
Yes	5	22		
No	6	67		
Blood Pressure			0.91	0.88 (0.1 < OR < 0.7)
Normal	10	80		
Hypertension	1	9		
Smoking			0.26	0
Yes	0	9		
No	11	80		
Physical Activity			0.19	2.420 (0.63 < OR < 9.21)
Adequate	4	17		
Inadequate	7	72		
Vegetable Intake			0.94	1.81 (0.45 < OR < 7.29)
Adequate	8	53		
Inadequate	3	36		

Fruit Intake			0.64	1.34(0.38< OR<4.72)
Adequate	6	42		
Inadequate	5	47		

Discussion

In this study, we highlighted that healthy lifestyle including adequate consumption of vegetable and fruit and also adequate physical activity was vary, but theres'no variable that significantly associated wkhith high level of random blood glucose. Random blood glucose screening shows that 11% of participants have high blood glucose level (≥ 200 mg/dL), while participants that have high blood pressure ($>140/90$ mmHg) was 10%. Although sudyng about the lifestyle of lower-risk people is not urgent priority for intervention, but its useful for public health intervention over 10-20 years(11). The recommended portion of fruit and vegetables as recommended by WHO is more than 400 g per day, so that the risk of T2D can be reduce(12). Green leafy vegetables intake was significantly reduce the development of T2DM(13). Consumption of fruit and vegetables also must be accompanied by another healthy lifestyle such as physical activity, avoid smoking, and prevent the development of high blood pressure. Habituation to consume fruit and vegetables should be campaigned in community, through various media such as poster, leaflet, and television.

We found that 63% of participant that have high RBG have no adequate physical activity. This should be a consideration for individu regarding that previously studies shows physical activity give beneficial and effective to prevent the development of T2DM if conduct regularly and consistent with minimum duration about 150 minutes/week. Moderate intensity of study in 6,000 men reveal that increase of physical activity as many as 500 kcal/week can reduced the age-adjusted risk of T2DM about 6%(14). Physical activity not only can prevent individu to develop T2DM, but also can control their blood pressure. If the blood pressure was maintenance in normal value, so that cardiovascular disease and early mortality can be prevent. Of these, high percentage of risk to develop T2DM can decreases by physical activity as many as 58%(15).

From this study, 9% of participants were an active smoker, but none of them have high RBG level. However, researcher still educate them to move to healthy lifestyles, since the RBG screening still can't be stand alone as diagnostic method to differentiate between normal people and people with T2DM, but it must be accompanied by another screening method such as OGTT as a gold standar. In spite classified as modifiable risk factors of diabetes, smoking was also classified as risk factor of other non-communicable diseases such as asthma, cardiovascular disease (CVD), asthma, and chronic obstructive lung disease. The Korean Diabetes Association was mentioned that smoking have been known as the leading causation of severe complication in people with T2DM(16). Smoking can stand alone as the risk factor of T2DM, even other confounding factors have been adjusted including social class, physical activity, body mass index (BMI), age, antihypertensive treatment, and alcohol intake(17).

Only 1 participant that have hypertension and also high level of RBG. The dual interaction of elevated blood pressure and blood glucose can lead to stroke and myocardial infarction(18). Some points that can be taught to the participant in order to maintenance their blood pressure level in normal value was vary. Based on the hypertension guidelines, there are six nonpharmacologic interventions that have been proven can normalize blood pressure level, including reduce intake of dietary sodium (maximum 5 g/day), healthy diet, enhanced intake of dietary potassium, weight loss through physical activity, and minimized alcohol intake. Those methods also need the support from the family member, especially to make habituation of healthy diet. Half of participant with high level of RBG have family history with diabetes mellitus. This supported the previous report that family history was the risk factor of T2DM (19,20). Family and friends are the key that can determined how the someone can well manage their risk factors of the development to T2DM (21).

In low income countries, the using of glycated hemoglobin (HbA1c) for screening of blood glucose is rare due to the high cost and time consuming. Instead, the using of RBG as rapid screening have been used widely(22). High level of RBG is a sign warn for the development of T2DM. Although the implementation of using RBG is still debated, The International Federation have been extend and recommended using RBG as a screening with the nondiagnostic glucose value between 100 and 199 mg/dL(23). In limited clinical settings, this screening were used as opportunistic screen for diabetes (24,25).

In this study, we found that 8% of participant that have high RBG level didn't aware and never monitor their blood glucose. Accompanied by unhealthy lifestyle, the concistenly high blood glucose can

lead to intolerance insulin and develop to be T2DM. Education for healthy lifestyle must be campaigned especially about food consumption, since have been known that capillary blood glucose is a reflection of what the person has eaten (26). Lifestyle change have been campaigned to reduce the prevalence of T2DM, since have been known that lifestyle take a big portion as risk factor of T2DM. The American Diabetes Association (ADA) was recommended type of food that can help to minimize the risk of T2DM (nuts, yogurt, berries, whole grains, tea, and coffee), while food that can increase risk of T2DM (sugar-sweetened beverages and red meats)(27).

CONCLUSION

We conclude that lifestyle of the participant in this study still need to be improved and move to the more healthy lifestyle such as increase the frequency of physical activity, fruit intake, vegetable intake, avoid smoking, and monitoring regularly their RBG level.

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