THE CORRELATION BETWEEN STRESS, SELF-EFFICACY OF PHYSICAL ACTIVITY, AND PREDIABETES RISK IN ADULTS AT SAINT THOMAS THE APOSTLE CHURCH, BEKASI

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ABSTRACT

Nowadays, changes in lifestyle patterns may cause a lack of physical activity and high-stress level which triggers prediabetes. Some people are unaware that they suffer from prediabetes since no symptoms appear. This study aimed to determine the correlation between the incidence of stress and self-efficacy of physical activity to the risk of prediabetes in Saint Thomas The Apostle Church Bekasi. This research was conducted with a quantitative approach and cross-sectional design. As many as 66 respondents were recruited by purposive sampling technique. The data collection instrument used a Self-Efficacy Exercise (SEE) questionnaire, Perceived Stress Scale (PSS), and Indonesian Prediabetes Risk Score (INA-PRISC) to measure prediabetes. Data analysis used the Kendall Tau-C statistical test. The univariate analysis showed that most respondents had moderate stress (83.3%). In addition, more than half of the respondents had low self-efficacy in physical activity (66.7%), and a very low risk of prediabetes (66.7%). This study also revealed a significant correlation between self-efficacy in physical activity and the risk of prediabetes (p-value o0.030). It is suggested that respondent at Saint Thomas The Apostle Church Bekasi develop a health promotion program assisted by health workers to create a lifestyle pattern regarding good stress management and physical activity self-efficacy to decrease prediabetes risk.

Keywords: Pre-diabetic, Self-Efficacy Physical Activity, Stress

INTRODUCTION

The current development may cause changes in unhealthy lifestyle patterns, resulting in an increase in non-communicable diseases and becoming a big problem for public health in the world. One of them is Diabetes Mellitus (DM). The International Diabetes Federation (IDF) organization stated that 483 million people aged 20-79 years in the world had diabetes in 2019, equivalent to a prevalence rate of 9.3% of the total population. Indonesia is the only country in Southeast Asia that occupies the 7th position out of 10 countries with the largest number of 10.7 million deaths in the community, which are caused by hypertension, stroke, cancer, heart disease, and diabetes mellitus (Kementrian Kesehatan Republik Indonesia, 2020). According to data from the Bekasi City Statistics Center in 2017, the number of people with diabetes mellitus was 8,459 (Ayutthaya & Adnan, 2020); however, there are no recent data on the increase in people with diabetes mellitus in Bekasi City. This is because people do not know that diabetes is preceded by an increase in pre-diabetes; therefore, to reduce the increase in pre-diabetes to diabetes, early prevention steps are needed (Priantoro, 2017).

According to the American Diabetes Association (ADA), 'pre-diabetes' is an

early stage of diabetes, which is a condition where blood glucose levels in the body are high or above the normal threshold but are not yet referred to as diabetes mellitus. (ADA, 2020); which, if not prevented, will cause other diseases such as cardiovascular disease (Syahitdah & Nissa, 2018). A person is categorized as suffering from pre-diabetes according to the America Diabetes Association (ADA) if fasting blood sugar levels (100-125 mg/dL) are referred to as Impaired Fasting Glucose (IFG)/GDPT or Impaired Glucose Tolerance (IGT)/TGT (140-199 mg/dL, 2 hours after loading 75 g glucose) (Sulistiowati & Sihombing, 2018). The condition of pre-diabetes is often not detected because people tend to ignore or underestimate the signs and symptoms, and this happens due to the lack of exposure to public knowledge about risk factors for prediabetes.

Several risk factors for pre-diabetes include hypertension (>140/90 mmHg), family history or heredity of diabetes mellitus, and high density lipoprotein (HDL) cholesterol 25 kg/m² or >23 kg/m²) (ADA, 2019). Entering the era of society 5.0, people can solve various social challenges and problems by utilizing various innovations in industry 4.0. Along with increasingly massive technological developments, people's lifestyle patterns have also shifted where many prefer to shop online. Thus, people can buy without having to queue, as well as taking advantage of the many tempting offers made through applications created to make it easier for individuals to carry out their activities. Individuals who used to buy and queue to fulfill their needs now do all their activities at home and purchase all the necessities they need only through smartphones. (Febriyanti & Yusri, 2020). This condition becomes a big risk for disease, due to a lack of physical activity.

The most recent data show an increase in low physical activity during the pandemic, from 26.1% to 33.5% (Ramadhani, 2020). Self-efficacy (SE) Physical activity is an individual's belief in his or her own ability to achieve the desired self-efficacy by carrying out physical activities, starting with light activities such as walking, tidying the bed, and sweeping the floor to control and manage blood sugar levels. SE physical activity is used to control blood sugar levels by controlling daily activities for individuals (Aprilliya et al., 2013).

Another factor that triggers pre-diabetes is stress. Stress is a response when adrenaline increases in the body in response to a phenomenon that disturbs mind. It cannot be avoided because everyone experiences it

(Anita, 2018). The impact of stress on each person is different, such as on physical, psychological, intellectual, social, and spiritual levels; stress can also threaten physiological health (Anita, 2018). Stress triggers an increase in blood sugar levels because when in stress, the hormone cortisol increases so that it encourages the pancreas to produce more insulin, resulting in an increase in blood sugar levels (hyperinsulinemia), muscle mass, and fat mass by counteracting the action of insulin (Husmarini et al., 2019).

As a result, the study sought to ascertain the relationship between stress, self-efficacy of physical activity and the risk of prediabetes in adults at Saint Thomas the Apostle Church Bekasi.

METHOD

This study used a quantitative approach with a cross-sectional design. The population of this study was adults aged 20 to 45 in Sint Thomas the Apostle Church Bekasi which included up to 125 people. The sample was chosen using purposive sampling technique, resulting in 66 respondents.

The instruments used in this study included the Indonesian Pre-diabetic Risk Score (INA-PRISC) questionnaire which has been tested for validity on 6.933 subjects (Fujiati et al., 2017). Perceived Stress Scale (PSS) questionnaire has been tested for validity on 2.387 subjects with a result of 0.80 ($\alpha = >$ 0.60) (Husmarini et al., 2019). Self-Efficacy Exercise (SEE) questionnaire has been tested for validity on 187 subjects with a result 0,92 ($\alpha = >0,60$) (Resnick & Jenkins, 2000). All of the questionnaires were distributed in hard copy to the respondents.

This study used bivariate analysis to see the correlation between pre-diabetes and self-efficacy of physical activity at Sint Thomas the Apostle Church Bekasi. The correlation between pre-diabetes and stress were analysed using Kendall's tau C statistical test. The study was approved by the Sint Carolus School of Health Sciences ethics committee (No. 056/KEPPKSTIKSC/IV/2022).

RESULT

Table 1 showed that most of the respondents were 26-35 years old (50%), female (68.2%), achieving high education (98.5%), having a history of DM in the family (grandpa/ grandmother/ father/ mother) (15.2%), smoking (21.2%), physical activity <150 minutes/week (51.5%), obesity >25 (48.5%), and hypertension (89.4%).

Table 1. Distribution of components in the INA-PRISCH questionnaire among adults
at Thomas Rasul Church Bekasi in 2022 (N=66)

Characteristics	n	%
Age, years		
20-25	20	30.3
26-35	33	50.0
36-45	13	19.7
Gender		
Woman	45	68.2
Man	21	31.8
Education Level		
Uneducation (never been to school/not completed primary school)	0	0
Low Education (primary school certificate)	1	1.5
High Education (high school and above)	65	98.5
Diabetes History in First Degree		
Yes	10	15.2
No/Unknown	56	84.8
Smoking Habbit		
Yes	14	21.2
No	52	78.8
Physical Activity		
No or <150 min/week	34	51.5
Yes or >150 min/week	32	48.5
BMI		
>25 (obese)	32	48.5
23-24.9 (overweight)	10	15.2
18.5-22.9 (normal)	24	36.4
Hypertension		
SBP >160 mmHg or DBP >100 mmHg	2	3.0
SBP 140-159 mmHg or DBP 90-99 mmHg	5	7.6
SBP 120-129 mmHg or DBP 80-89 mmHg	59	89.4

Table 2. Distribution of Pre-diabetes Level (INA-PRISCH) of Respondents
at Thomas Rasul Church Bekasi in 2022 (N=66)

Pre-diabetes Level	n	%
Very Low Risk (0-6)	44	66.7
Low Risk (7-11)	19	28.8
Moderate Risk (12-17)	3	4.5
Total	66	100

Table 3. Distribution of Respondents' Stress Levels in adults
at Thomas Rasul Church Bekasi in 2022 (N=66)

Stress Level	n	%
Low Stress (1-13)	5	7.6
Moderate Stress (14-26)	55	83.3
Severe Stress (27-40)	6	9.1
Total	66	100

Based on Table 2, 44 respondents (66.7%) were at very low risk, followed by low risk with 19 respondents (28.8%). The results of the stress level (table 3) show that most respondents had moderate stress levels with 55 respondents (83.3%).

Table 4. The Correlation between Stress Levels and Risk Factors for Pre-diabetic in adults at Thomas Rasul Church Region of Bekasi in 2022 (N=66)

Stress	Pre-diabetic Risk						P value
	Very Low risk		Low Risk		Medium Risk		
	N	%	N	%	N	%	
Low Stress	2	40%	2	40%	1	20%	0,116
Moderate Stress	37	67.3%	16	29.1%	2	3.6%	
Heavy Stress	5	83.3%	1	16.7%	-	-	

From the results of the study (Table 4), it was found that 2 respondents (40%) with low stress had a very low risk of pre-diabetes, 37 respondents (67.3%) with moderate stress had a very low risk of pre- diabetes, and 5 respondents (83.3%) with severe stress had a very low risk of pre- diabetes. Based on the results of Kendall's Tau test, it was found that there was no significant correlation between the incidence of stress and pre- diabetes. With a p-value of 0.116 (p > 0.05).

Based on the results on Table 5, most of the respondents, totaling 44 respondents (66.7%), had a low SE in physical activity.

Table 5. Distribution of Self-Efficacy of Respondents' Physical Activity at Thomas Rasul Church, Bekasi in 2022

Self-Efficacy Physical Activity	n
SEPA Low < 45	44
SEPA Height 45	22
Total	**66**

Table 6. The Correlation between Self-Efficacy of Physical Activity and Risk Factors of Pre-diabetes
in adults at Saint Thomas the Apostle Church Bekasi in 2022

Self Efficacy of Physical Activity	Pre-diabetic Risk						P value
	Very Low Risk		Low Risk		Medium risk		
	N	%	N	%	N	%	
SEPA Low < 45	26	59.1%	15	34.1%	3	6.8%	
							0.030
SEPA > Height 45	18	81.8%	4	18.2%	-	-	

According to the results of the study, 26 respondents (59.1%) with low self - efficacy in physical activity had a very low risk of pre-diabetes. It was followed by 15 respondents (34.1%) with moderate risk of being pre-diabetes. In addition, 18 respondents (81.8%) with high self -efficacy physical in activity had a very low risk of pre-diabetes. To sum up, based on the Kendall's Tau C test, it was found that there was a significant correlation between self-efficacy in physical activity and pre-diabetes with a p-value of 0.030 ($p < 0.05$).

DISCUSSION

In this study, "pre-diabetes' is a term used to describe a concentration of blood glucose or hemoglobin which was glycated (HbA1c) above normal but not yet classified as diabetes. Pre-diabetes manifests as impaired fasting blood glucose (GDPT) or impaired glucose tolerance (TGT) or HbA1c levels, which increase the risk of type 2 diabetes (Tim PERKENI, 2019). Pre-diabetes is a stage related to diabetes, a condition where blood glucose levels in the body are high or above the normal threshold but are not yet known as diabetes mellitus (ADA/American Diabetes Association, 2020). A person is categorized as suffering from pre-diabetes according to the ADA if fasting blood sugar levels (100-125 mg/dL) are referred to as Impaired Fasting Glucose (IFG)/GDPT or Impaired Glucose Tolerance (IGT)/TGT (140 -199 mg/dL, 2 hours post-load glucose 75 g glucose). IFG is a condition of high blood sugar levels after fasting, and IGT is a condition of high blood sugar levels 2 hours after eating (Sulistiowati & Sihombing, 2018). Previous research (Noventi et al., 2019) found that 22 respondents (73.4%) had a low risk of pre-diabetes. This current study is in line with the previous research where most of the respondents, as many as 44 respondents (66.7%) were at very low risk.

Stress causes anxiety and depression because stress activates the hypothalamus and controls the neuroendocrine system

through the Hypothalamus-Pituitary-Adrenal (HPA) pathway. The hypothalamus gland secretes CRH (corticotrophin-releasing hormone) to signal the pituitary gland to produce the hormone ACTH (adrenocorticotropic hormone). The ACTH functions to trigger the adrenal glands to release the hormone cortisol which regulates the body's metabolism and blood pressure. HPA releases catecholamine hormones, which also act as neurotransmitters, namely dopamine, adrenaline, and non-adrenaline.

Catecholamines activate the amygdala nucleus (causing fear) which triggers an emotional response to stressors (Derek et al., 2017). Respondents said that they often felt anxious and depressed when they are stressed, because of high work demands and difficulty in managing time for work and family. In a stressful situation, insulin resistance occurs which causes an increase in blood sugar, due to the raise of stress hormone (cortisol hormone). It also encourages the pancreas to produce more insulin which causes the process of glucose metabolism in cells to be imperfect, causing blood sugar levels to increase (Gresty N, 2017). This is in line with previous research (Gresty N., 2017) which found that in 38 respondents (50.7%), there was a significant correlation (p = <0.0001) between the level of severe uncontrolled stress and DM. This happens because stress hormones in people with diabetes will increases, which causes blood sugar levels to rise.

Furthermore, research done by Nadziroh (2016) explains that the coping mechanism is an effort made by individuals to manage stress when a stressor appears. One of them is an adaptive coping mechanism where the coping mechanism supports the function of integration, learning, growth, and achieving its goals. According to William's findings, there may be several other factors that contribute to the pathophysiological process of stress that affects glucose levels acutely and inconsistently, causing an increase in blood glucose intolerance, such as low energy levels, a poor health status, and a lack of physical activity (Husmarini et al., 2019).

Another possibility that can affect stress levels for pre-diabetes is a sedentary lifestyle where the average respondent is a woman or mother whose activities are mostly sitting, either opening a business at home, watching soap operas or dramas, or sitting in front of a laptop while working. In addition to a sedentary lifestyle, the

respondent's eating pattern affects pre-diabetes. Most respondents prefer to order or cook fast food, which is time-saving and appetizing. This behavior becomes a habit and has an impact on weight gain and even causes obesity. Previous researchers (Ambarita & Prabawati, 2022) found that a sedentary lifestyle has an effect on pre-diabetes, as measured by the Kendall's Tau C test with a p value of 0.027 ($\alpha = 0.05$).

Low self-efficacy in physical activity refers to individuals' lack confidence in their ability to engage in physical activity. This condition shows that the lower the self-efficacy of a person's physical activity, the higher the risk of experiencing pre-diabetes. In line with the research done by Ambarita & Prabawati (2022) on sedentary lifestyle, there is a correlation between a sedentary lifestyle and pre-diabetes at Johar Baru Health Center with p value = 0.027 (p < 0.05). This emphasizes that a lack of physical activity will lead to impaired insulin release and cause hyperglycemia. Physical activity itself is useful for regulating blood sugar levels. When the muscles contract to cause movement, there is a change in glucose into energy stored in the muscles.

Some respondents said they could not manage their time between physical activities and personal activities; the respondents tended to fill the void to hanging out, eating together or shopping together to relieve fatigue. Theoretically, as a human being, he or she is aware of doing sports, but a person lacks the self-confidence to prove his or her ability to perform tasks and change their lifestyle in an effort to maintain health (Sarwuna, 2020). Individuals who have high SE can deal with difficulties and make good decisions in solving their health problems, but individuals have low SE will face difficulties in solving their health problems (Rahman et al., 2017). This is proven by study conducted by Sarwuna (2020) that a person's level of education greatly influenced his confidence in self-efficacy. This belief is formed out of self-awareness by supporting behavior to do something that is beneficial to his/her health in his/her daily life.

LIMITATION OF STUDY

The study was conducted only in one church at one region. Therefore, the results of the study cannot be generalized.

CONCLUSION

To conclude, there was no significant correlation between the incidence of stress

and the risk of pre-diabetes. Also, there was a significant correlation between self-efficacy of physical activity and the risk of pre-diabetes (p-value <0.05)

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