

ORIGINAL ARTICLE

Self-awareness of diabetes mellitus and prediabetes status among patients with overweight in the Jember area

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ABSTRACT

Introduction: People who are excess weight have expanded insulin resistance and the development of high blood sugar, which drives prediabetic status and later generates diabetes mellitus. Someone can experience prediabetes for several years, but they don't know any symptoms. Ultimately, they experience health problems leading to type 2 diabetes mellitus. Patients who are overweight lack self-awareness about diabetes mellitus (DM). **Objectives:** This research aims to determine the relationship between self-awareness and prediabetes status in overweight patients. **Method:** This research uses an analytic design with a cross-sectional approach. There were 84 respondents obtained from the accidental sampling technique. Data were collected from the Self Awareness Diabetes Mellitus questionnaire and random blood glucose results. Data were analyzed using Spearman rank with a significance value of 0.05. **Result:** The results showed a significant relationship between self-awareness about DM and prediabetes status with a negative correlation ($p < 0.001$; $r = 0.678$). This correlation means that the higher the self-awareness, the lower the respondent has prediabetes. In overweight patients, fat accumulation in the body can reduce insulin action, affecting prediabetes. Self-awareness is an attitude that someone with excess body weight must possess to prevent prediabetes. **Conclusion:** This study revealed the importance of increasing self-awareness and enforcing blood glucose control routinely so that someone who has entered the prediabetes category can enhance their lifestyle to stop diabetes mellitus.

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1. Introduction

Excess body weight is the highest factor that triggers prediabetes (Alam et al., 2016). Lifestyle changes such as eating patterns containing lots of fat and carbohydrates and low physical activity can lead to excess weight gain (Liberty, 2016). A gain in body mass index (BMI) in someone with a risk of existing overweight can increase the occurrence of prediabetes (Rahmanian et al., 2016). In this generation, inadequate lifestyle shifts can increase the risk of prediabetes if not followed by good self-awareness behaviors. Self-awareness of DM disease can be accomplished by focusing on blood sugar levels or living a healthy lifestyle. Self-awareness of health behavior positively impacts people with prediabetes (Owei et al., 2019).

The global prevalence of prediabetes was around 8% in 2011 and is expected to increase to 10% in 2030. According to the International Diabetes Federation (IDF) (2017), 352.1 million people worldwide, or 7.35% of adults, have prediabetes. It is estimated that this will increase to 587 million people, or 8.3% of the adult population. In 2045, Indonesia will be fourth with prediabetes, with 7.6 million people. In 2013, there were 36.6% cases of prediabetes in Indonesia (Ameline 2017). According to Riskesdas (2018), overweight and obesity have a risk of prediabetes. There were cases of incidence of 11.5% and 14.8% in 2013, which increased to 13.6%

and 21.8% in 2018. Based on data from the Ministry of Health RI (2018), in East Java in 2018, there were around 22% cases of obesity. In 2016, there was 15.48% obesity in East Java or 2,826,082 people. From examinations at the Jember regional health center, cases of obesity in 2016 in Jember there were 22,323 people out of 82,905 people who underwent obesity checks.

Issues of prediabetes continue to increase, predominantly driven by the highest risk factor, namely being overweight (Alam et al., 2016). Self-awareness is essential for everyone, especially those who are overweight, to reduce the risk of other disease complications. To overcome this problem, nurses can carry out health promotion to increase self-awareness to avoid the risk of disease caused by excess body weight and by early screening to decrease the incidence of undiagnosed diabetes and reduce the incidence of prediabetes to type 2 DM. This study aims to determine the relationship between self-awareness and prediabetic status in overweight patients at Baladhika Husada Hospital Jember.

2. Methods

The research method used in this study was a quantitative analytic design with a cross-sectional approach. The sample of this study was overweight patients who were having their health checked at the Polyclinic of Baladhika Husada Hospital Jember, whose precise population size was unknown. The sampling technique used an accidental sampling technique. Sample estimation using power analysis with G*Power application with effect size = 0.30, power (1-β) = 0.80, α = 0.05 as many as 84 respondents. The inclusion criteria were patients at the Baladhika Husada Hospital Jember Polyclinic, having BMI ≥25kg/m² and aged ≥35 years. The exclusion criteria were patients with DM type 1 or DM type 2. Data was collected using the Self-Awareness Diabetes Mellitus (DM) questionnaire instrument. Meanwhile, the finding of prediabetic status uses a simple random blood sugar check using a glucose test. The self-awareness Diabetes Mellitus questionnaire has been tested for validity by Huda (2017) with the results that a correlation coefficient was 0.403–0.726 (r > 0.361), and Cronbach's Alpha reliability test shows α = 0.954. The technical implementation of the research was that patients at the Baladhika Husada Hospital Jember Polyclinic were investigated for weight and height earlier to calculate Body Mass Index/BMI. Then the patient was asked to complete a questionnaire and check random blood sugar levels. This research was achieved from January to February 2020. Data analysis used the Spearman rank test with a significance level of α = 0.05 perform using SPSS 23 Software.

3. Results

Demographic characteristics of the hospital's outpatient showed an average age of 57.29. The youngest is 36 years old, the oldest is 83, and the majority are women (71.43%). While the average value of the patient's body mass index was 29.13, with a median value of 28.15; the lowest BMI value of 25, and the highest was 39.7. Based on the family history of DM, most respondents did not have a family history of DM (83.33%), and only about 16.67% had a family history of diabetes. The majority of respondents had normal random blood sugar levels of 51 (60.7%), and the rest of them were in prediabetes status (39.3%).

Related to self-awareness categories among respondents, most respondents had good self-awareness (59.5%), followed by respondents with sufficient self-awareness (40.5%), and no respondents with less self-awareness. The details are shown in Table 1.

Table 1. Respondents' Characteristics (n=84)

Indicator	f	Percentage (%)	Mean (SD)	Median (Min-Max)	Q1	Q3
Gender						
Male	24	28,57				
Female	60	71,43				
Age			57,29 (±10.49)	59 (36-83)	50	65

Body Mass Index (BMI)		29.13 (± 3.50)	28 (25-39,7)	26,43	30,95
Family history of DM					
Yes	14	16,67			
No	70	83,33			
Self-Awareness category:					
Good Self Awareness	50	59,5			
Enough Self Awareness	34	40,5			
Less Self Awareness	0	0			
Prediabetes Status:					
Prediabetes	33	39,3			
Normal	51	60,7			

Table 2. Relationship between self-awareness and prediabetes status in overweight patients (n=84)

Variable	<i>R</i>	<i>P</i>	Type of correlation
Self-Awareness Prediabetes	0,678	0,001	- (negative)

Based on the data analysis using the Spearman rank, there was a significant relationship between self-awareness and prediabetes status in patients who are overweight (p-value <0.05). The correlation (r) obtained was 0.678, indicating a strong correlation. The direction of the correlation is negative, meaning that the higher the respondent's self-awareness, the lower the respondent has prediabetes.

4. Discussion

The results of this study indicate that the average age of the respondents is 57.29. While most respondents suffering from prediabetes occurred in late adulthood > 60 years, as many as 16 respondents. This is in line with the research by Bahijiri et al. (2016), which stated that 10-15% of those over 50 years had prediabetes from 1420 respondents. The aging process causes disturbances in energy homeostasis and abnormalities in carbohydrate metabolism (Mordarska & Godziejewska-Zawada, 2017). With increasing age, a decrease in the compensatory capacity of beta cells causes insulin resistance, so blood sugar levels are above normal (Yakaryılmaz & Öztürk, 2017).

The majority of the respondents' gender were female, 60 (71.43%). Meanwhile, the majority of respondents who suffered from prediabetes were 24 men (28.57%). Amiri et al. (2017) showed that most prediabetes occurred in male respondents, as much as 27.4% of 5,568 respondents and 23.5% of respondents with prediabetes. Another study found that prediabetes occurred in men as many as 15 (48.4%) (Seukenty et al., 2018). In men, the factor directly related to prediabetes is BMI, and males are more prone to central obesity, which harms metabolism (Amiri et al., 2017). Other factors that support prediabetes in men are high systolic blood pressure and smoking behavior (Aldossari et al., 2018).

Most respondents did not have a history of DM in the family, as many as 70 (83.3%). While 14 respondents had a history of DM in their family, 10 (71.43%) had prediabetes. Hu et al. (2019) revealed that respondents with prediabetes who had a history of DM in the family were 95% of 425 respondents. DM is inherited according to Mendelian law in an autosomal recessive manner with incomplete penetration. If both parents suffer from DM, their children will have a risk of DM (Rahmi et al., 2015). Prediabetes can run in families with DM sufferers, especially if it is followed by factors that recreate an essential role in prediabetes, namely obesity and lack of physical activity (Praet & van Loon, 2009).

In the study, respondents had the lowest BMI of 25, and the highest score of BMI reached 39.7. Respondents who suffered from prediabetes had the majority of obesity levels one, as many as 11 (61.1%). [Liberty et al. \(2016\)](#) showed that prediabetes in people with excess weight was 51% of the 89 respondents. BMI in the category of obesity can affect the cause of leptin hormone resistance that triggers prediabetes ([Facey et al., 2017](#)). Fat accumulation in people with obesity can also affect insulin work associated with prediabetes. Intra-abdominal fat accumulation is considered more lipolytic than subcutaneous fat, and it does not efficiently respond to the antilipolytic action of insulin. In another way, intra-abdominal fat plays a vital role in causing insulin resistance resulting in prediabetes ([Al-Goblan et al., 2014](#)).

The most self-awareness owned by respondents, namely good self-awareness, was 50 (59%). Another study conducted by Huda (2017) also showed the most self-awareness of DM, namely good self-awareness, in 45 respondents (68.2%). Someone who has good self-awareness and can apply it in his life can achieve good prediabetes prevention ([Konduru et al., 2017](#)). The indicator that plays the most role in self-awareness is self-awareness in preventing DM, with the highest average score of 65.23. The prevention of DM includes a healthy diet and lifestyle, including the habit of consuming carbohydrates, eating and drinking sweets, and a person's physical activity. A diet that minimizes fat intake and reduces fat in the body by increasing physical activity can help insulin do its job correctly ([Asif, 2014](#)).

Results of prediabetes status were 51 (60.7%) respondents with normal random blood sugar levels and 33 (39.3%) with prediabetes. There were 51 (60.7%) respondents with normal random blood sugar levels and 33 (39.3%) with prediabetes. The study results showed that the highest percentage of patients with prediabetes occurred in patients with grade one obesity, 61.1% (11 respondents). [Aldossari et al. \(2018\)](#) showed that 381 respondents, 27.6%, had prediabetes. Among those patients with prediabetes were overweight 31.4% and 49.5% were obese. In people with obesity, fat accumulation contributes to abnormal glucose metabolism, which involves adipose tissue activity. Adipose cells secrete several cytokines and adipokines, which can have cardiometabolic effects. This condition will harm the body and disrupt the regulation of blood sugar control ([Hu et al., 2019](#)). In obese individuals, the portion of nonesterified fatty acids, pro-inflammatory markers, cytokines, glycerol, hormones, and other substances affected in developing insulin resistance increases. The pathogenesis in the development of diabetes is based on the β -islet cells of the pancreas being damaged, causing a lack of control of blood glucose ([Al-Goblan, 2014](#)).

Relationship of self-awareness with prediabetes status in patients with overweight

The Spearman rank analysis test results on self-awareness and prediabetes variables showed a p-value <0.001 with a negative correlation direction at -0.678, indicating a non-unidirectional correlation. It means that the higher the self-awareness of people with excess body weight, the lower the occurrence of prediabetes. The study results found that the majority, namely 50 (59.5%) of respondents, had good self-awareness. Someone with self-awareness of DM will develop an attitude of applying his knowledge in everyday life to prevent prediabetes ([Konduru et al., 2017](#)). Based on the [American Association of Clinical Endocrinologists \(2015\)](#) explains that lifestyle management can be done to avoid the risk of prediabetes. The self-awareness indicator that plays the most role includes lifestyle management styles. Other results show that 30 respondents (40.5%) have sufficient self-awareness. It can be encouraged that respondents have implemented and maintained a good lifestyle, especially eating patterns that affect the control of blood sugar levels, to remain stable.

Someone with excess weight can occur because of an unhealthy lifestyle pattern, such as consuming a diet with lots of fatty foods and excess carbohydrates, supported by low physical activity ([Liberty, 2016](#)). Suppose someone has excess weight and is not self-aware of their health condition. Fat accumulation will form adipose tissue that competes in glucose utilization,

disrupting the glucose oxidation rate. Finally, their blood sugar concentration increases, promoting DM, previously preceded by prediabetes (Holt et al., 2017).

The dominant indicator of self-awareness is the prevention of DM which contains self-awareness in lifestyle management and eating patterns. The results of previous studies conducted in structured lifestyle trials, including physical activity of at least 150-175 minutes/week and dietary energy restriction of 5% - 7% targeting weight loss, have shown a 40% - 70% reduction in the risk of developing prediabetes into DM (Colberg et al., 2016). Owei et al. (2019) said that self-awareness positively impacts people with prediabetes, such as lifestyle management, diet, and blood sugar monitoring.

Table 5 shows that most respondents have a normal random blood glucose of 51 (60.7%), compared to random prediabetic blood glucose of 33 (39.3%). Normal random blood glucose status dominated by normal status followed by the majority of respondents having good self-awareness indicates that it can reduce the incidence of prediabetes in overweight patients at the Baladhika Husada Hospital Polyclinic in Jember. Factors supporting this study's low cases of prediabetes are the number of respondents with good self-awareness. Factors of knowledge about DM and self-awareness can be a prevention of prediabetes. Self-awareness is an interaction between thoughts and feelings (Brooker & Waugh, 2007). Finally, knowledge about DM plays a role in reducing prediabetes cases if followed by someone applying the knowledge they have in the long term.

Self-awareness about diabetes mellitus, which is applied in the long term, can be crucial in preventing prediabetes. Konduru et al. (2017) stated that someone with good self-awareness of the disease has good knowledge of preventing prediabetes. Some people tend to feel afraid and anxious when they discover they have complications other than the disease they currently suffer from, and it becomes a stressor for someone who will make their self-awareness in himself decline. Efforts that can be made are carrying out early health screening in health services such as routine health checks, controlling blood sugar levels, and providing health education about the importance of controlling ideal body weight. In addition, self-awareness is also influenced by one's ethnicity and personality. Awareness is needed from within one's self to screen blood sugar and adopt a good lifestyle because prediabetes is known as early as possible, and followed by good self-awareness can reduce the risk of increasing blood sugar levels to DM status (Liberty, 2016).

5. Conclusion

Most respondents had self-awareness in the excellent category, and random blood sugar levels were normal. The analysis showed a significant relationship between self-awareness and prediabetes status in patients with excess weight who had a strong correlation value with a negative correlation. It can be concluded that the higher the self-awareness about diabetes mellitus, the lower the patients with overweight experience prediabetes. This study highlights that health services need to improve health education to control ideal body weight and early identification of prediabetic status so that people can control their lifestyle from an early age and prevent diabetes mellitus. However, some limitations of this study need to be improved. The future study needs to evaluate the self-care among prediabetes and other predisposing factors involving a larger sample size.

6. Ethics approval and consent to participate

This research has been declared ethically feasible through the health research ethics commission (KEPK) Faculty of Dentistry, University of Jember No.733/UN25.8/KEPK/DL/2019.

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