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FACTORS ASSOCIATED WITH THE INCIDENCE OF TYPE 2 DIABETES MELLITUS IN WOMEN AT THE PEJUANG HEALTH CENTER IN BEKASI CITY

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ABSTRACT

Background: The 2018 Riskesdas results show that the proportion of diabetes mellitus cases in women (1.8%) is higher than the 2013 Riskesdas results (1.7%). Data obtained from the Pejuang Health Center also shows that type 2 DM cases in women are higher in 2022 with 1,661 cases compared to 2021 with 1,454 cases. **Purpose:** The purpose of this research was to determine factors associated with incidence of type 2 diabetes mellitus in women at the Pejuang Health Center Bekasi City in 2023. **Methods:** Research design used quantitative analysis with a case control approach. This research was from February to July 2023. Population in this study were women who came for screening non-communicable disease at the Pejuang Health Center. Number of samples based on the formula is 94 respondents with a sampling technique using purposive sampling. Data source from secondary data thats monthly report data Pejuang Health Center and primary data. The analysis used was univariate and bivariate analysis with Chi-Square test. **Results:** The results showed that there was a relationship between hypertension (p=0.007), physical activity (p=0.039), and obesity (p=0.011) with the incidence of type 2 DM in women. There was no relationship between a history of gestational diabetes mellitus (GDM) (p=0.410) and a history of giving birth to babies ≥ 4000 grams (p=1.000) with the incidence of type 2 DM in women. **Conclusion:** Therefore, people who are obese can start doing weekly physical activity, such as taking part in gymnastics activities held by the Pejuang Community Health Center.

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INTRODUCTION

Non-communicable diseases (NCDs) are diseases that cannot be transmitted to other people and last a long time. NCDs are one of the diseases that cause major deaths throughout the world (Benziger et al, 2016). In 2022, World Health Organization (WHO) said that NCDs were collectively responsible for 74% of all deaths worldwide (WHO, 2022).

One of the cases of NCDs that continues to increase is Diabetes Mellitus (DM), which is a chronic NCDs disease if the pancreas does not produce sufficient amounts of insulin or the insulin produced cannot be used effectively by the body (Nasution, 2021). According to the International Diabetes Federation (IDF), Indonesia experienced an increase in DM cases from 10.7 million cases in 2019 to 19.47 cases in 2021 (IDF, 2021). The Ministry of Health Republic of Indonesia (Kemenkes RI) estimates that by 2030 there will be 30 million people in Indonesia suffering from diabetes (Kemenkes, 2018). Based on the 2018 Basic Health Research (Riskesdas) report, an overview of the proportion of DM cases by gender in Indonesia shows that the proportion of DM cases in women is 1.8% higher than men, there is an increase compared to 2013 which was only 1.7% (Riskesdas, 2013 & 2018).

Riskesdas results also show an increase in the prevalence of DM in West Java from 1.3% in 2013 to 1.74% in 2018 (Riskesdas, 2013 & 2018). Bekasi City is one of the cities in West Java which experienced an increase in the prevalence of DM cases in 2021, from 1.7% in 2020 to 2.2% in 2021 (West Java Health Office, health profile report, 2020 & 2021). According to data from all health centers in the Bekasi City Health Service in 2022, the number of DM cases was 54,661 cases. Based on gender, in 2022 there will be an increase in the number of DM cases in women, from previously 28,878 cases to 40,474 cases in 2021. One of the community health centers in Bekasi City, namely Pejuang Community Health Center, has the highest number of new cases of diabetes mellitus in 2022 in female sufferers, namely as many as 1,661 cases, while in men there were 1,242 cases (Bekasi City Health Office data, 2022).

Diabetes mellitus is influenced by several risk factors, such as obesity or women's Body Mass Index (BMI), which is often not ideal, which causes a decrease in insulin response sensitivity (Meidikayanti et al, 2017). A history of type 2 DM in women is also associated with gestational diabetes mellitus (GDM) and a history of giving birth to a baby of more than ≥4000 grams. It is estimated that in the future, women with gestational diabetes mellitus are 7 times more likely to suffer from Type 2 DM after pregnancy (Fadillah et al, 2016). Hypertension also influences the incidence of type 2 DM in women. This happens because the blood vessels thicken and cause their diameter to narrow. This can inhibit the release of glucose from the blood (Fadillah et al, 2016).

Diabetes Mellitus is a non-communicable disease that requires serious attention and early detection of this disease is very important as an effort to control the disease (Kumalasari et al., 2023). Based on the problems above, the aim of this research was to examine the factors associated with the incidence of type 2 diabetes mellitus in women at the Pejuang Community Health Center, Bekasi City.

METHODS

This type of research is a quantitative analytical design using a case control study design. The population in this study were all female patients who came to be screened for Non-Communicable Diseases (NCDs) at the Pejuang Community Health Center, Bekasi City in 2023. The sample for this study was women who had been pregnant and given birth, and lived in Pejuang Village with a sample size of 94 people. 47 people for the case group and 47 people for the control group. The inclusion criteria for the case group were a woman diagnosed with type 2 DM and hypertension who came for PTM screening at the Pejuang Bekasi City Health Center in 2023, lived in the Pejuang sub-district area, Bekasi City, a woman who had been pregnant and given birth, and was willing to be a respondent. The exclusion criteria for the case group were a woman who was pregnant and had previously suffered from another type of diabetes. The inclusion criteria for the control group were a woman who was not diagnosed with type 2 DM who came for PTM screening at the Pejuang Community Health Center, Bekasi City in 2023, lived in the Pejuang sub-district area, and was willing to be a respondent. The exclusion criteria for the control group were having been diagnosed with another type of diabetes.

This research was conducted at the Pejuang Community Health Center, Bekasi City from February to July 2023. The sampling technique in this research was the Purposive Sampling technique. Data collection in this research used

secondary and primary data. Secondary data was obtained from the Pejuang Community Health Center, namely data diagnosed with type 2 DM and hypertension, as well as obesity data. Meanwhile, primary data is data obtained directly from research subjects by conducting interviews and measuring respondents using a questionnaire including physical activity using the WHO Global Physical Activity Questionnaire (GPAQ) standard questionnaire, history of gestational diabetes mellitus (GDM) and history of giving birth to a baby ≥ 4000 grams. Data analysis was carried out using univariate analysis to see a picture of the variables, and bivariate analysis to see the relationship between variables.

RESULTS

Results include dependent and independent variables. The dependent variable is type 2 diabetes mellitus, while the independent variables are factors including history of gestational diabetes mellitus (GDM), history of giving birth to a baby ≥ 4000 grams, hypertension, physical activity and obesity. The results of data analysis univariate are presented in the table below (table 1).

Table 1. Frequency Distribution Based on Type 2 DM Incident and Characteristics of Respondents

Variables	Frequency (n)	Percentage (%)
Type 2 DM		
- Yes	47	50
- No	47	50
History GDM		
- Yes	16	17
- No	78	83
History giving birth ≥4000 grams	27	28,7
- Yes	67	71,3
- No		
Hypertension		
- Yes	65	69,1
- No	29	30,9
Physical Activity		
- Less active	49	52,1
- Active	45	47,9
Obesity		
- Yes	57	60,6
- No	37	39,4

Based on Table 1, shows the distribution of female respondents based on the incidence of type 2 DM at the Pejuang Community Health Center in 2023. Respondents who suffer from type 2 DM are 47 (50%) and those who do not suffer from type 2 DM are 47 (50%).

The factors associated with the incidence of type 2 DM in women are mostly not having a history of gestational diabetes mellitus (GDM) as many as 78 respondents (83%), not having a history of giving birth to babies ≥ 4000 grams as many as 67 respondents (71.3%), 65 respondents (6.1%) experienced hypertension, 49 respondents (52.1%) lacked physical activity, and 57 respondents (60.6%) experienced obesity.

Bivariate analysis was carried out to describe the risk and see the relationship between each research variable and the incidence of type 2 diabetes mellitus. If the p value ≤ 0.05 means there is a significant relationship between the two variables that have been tested, while > 0.05 means there is no relationship. significant between two variabeles The results of data analysis bivariate are presented in the table below (table 2).

Table 2. Association between Incident Type 2 Diabetes Mellitus (DM) and Characteristics of Respondents

Variables	**Incidence Type 2 DM**				***p value***	**OR (95% CI)**
	Yes		**No**			
	n	**%**	**n**	**%**		
History GDM						
- Yes	10	21,3	6	12,8	0,410	1,847
- No	37	78,7	41	87,2		(0,611-5,578)
History giving						
- Yes	14	29,8	13	27,7	1,000	1,110
- No	33	70,2	34	72,3		(0,434-2,713)
Hypertension						
- Yes	39	83	26	55,3	0,007	3,938
- No	8	17	21	44,7		(1,517-10,218)

Physical Activity						
- Yes	30	63,8	19	40,4	0,039	2,601 (1,131-5,980)
- No	17	36,2	28	59,6		
Obesity						
- Yes	35	74,5	22	46,8	0,011	3,314 (1,388-7,917)
- No	13	35,5	25	53,2		

DISCUSSION

The incidence of type 2 DM in this study occurred more frequently in respondents who did not have a history of gestational diabetes mellitus (GDM) amounting to 78.7%, while respondents who had a history of gestational diabetes mellitus (GDM) only amounted to 21.3%. The Chi Square statistical test pvalue was > 0.05, which means there is no significant relationship between a history of gestational diabetes mellitus (GDM) and the incidence of type 2 DM. Women who have experienced gestational diabetes mellitus during pregnancy are not at risk of suffering from type 2 DM than women who have experienced gestational diabetes mellitus. This research is not in line with research conducted in the Netherlands which stated that women who experience gestational diabetes mellitus (GDM) are at higher risk of suffering from type 2 DM. From 35% to 60% of women develop type 2 DM within 10 years (Heida et al, 2015). There have not been many studies on gestational diabetes mellitus in Indonesia, but according to a 2020 meta-analysis research by Zhuyu et al in China, the incidence rate of type 2 DM after gestational diabetes mellitus (GDM) was found to be 26.20 per 1000 people. The risk of developing type 2 DM is greater in women with a history of gestational diabetes mellitus in Asian countries (Zhuyu dkk, 2020).

In this study, the incidence of type 2 DM occurred more frequently in respondents who had no history of giving birth to babies ≥ 4000 grams, amounting to 70.2%, while respondents who had a history of giving birth to babies ≥ 4000 grams were only 29.8%. There is no significant relationship between a history of giving birth to a baby ≥ 4000 grams and the incidence of type 2 DM. Women who have given birth to a baby ≥ 4000 grams are not at risk of suffering from type 2 DM than women who have given birth to a baby ≥ 4000 grams. The results of this study are in line with Lisna's research in 2020 which showed that there was no relationship between a history of giving birth to a baby ≥ 4000 grams and the incidence of type 2 DM in women with a p value of >0.05 (Nasution, 2020) . Research conducted by Najah in 2014 also stated that there was no significant relationship between a history of giving birth to a baby ≥ 4000 grams and the incidence of type 2 DM (Syamiyah, 2014).

The incidence of type 2 DM in this study was more common in respondents who suffered from hypertension, amounting to 83%, while respondents who did not suffer from hypertension were only 17%. According to the Chi Square statistical test, a pvalue ≤ 0.05 is obtained, which means there is a significant relationship between hypertension and the incidence of type 2 DM. Women who suffer from hypertension are at risk of suffering from type 2 DM than women who do not suffer from hypertension. The research results obtained are not in line with Dyan & Ambarunik's 2020 research, which showed that hypertension was not related to the incidence of type 2 DM in women (Nugrahaeni & Danthin, 2020). Research conducted by Najah in 2014 also showed that hypertension does not have a risk for the incidence of type 2 DM in women, which means that hypertension has no significant relationship with the incidence of type 2 DM (Syamiyah, 2014).

The incidence of type 2 DM in this study occurred more frequently in respondents who were less active in physical activity, amounting to 63.8%, while respondents who suffered from type 2 DM were active in physical activity, only 36.2%. According to the Chi Square statistical test, it shows a p value ≤ 0.05, which means there is a significant relationship between physical activity and the incidence of type 2 DM. Women who are less physically active are at risk of suffering from type 2 DM compared to women who are active in physical activity. This research is in line with research by Nurrahma et al in 2022, that physical activity is related to the incidence of type 2 DM in women with p value ≤ 0.05 (Ramadhani et al, 2022). Previous research conducted by Dyan and Ambarunik in 2020 also stated that there was a relationship between physical activity and the incidence of type 2 DM in women, pvalue = 0.10 (Nugrahaeni & Danthin, 2020).

In this study, the incidence of type 2 DM occurred mostly in respondents who were obese, amounting to 74.5%, while respondents who were not obese were only 35.5%. According to the Chi

Square statistical test, a pvalue ≤ 0.05 was obtained, which can be concluded that there is a significant relationship between obesity and the incidence of type 2 DM. Women who are obese are more at risk of suffering from type 2 DM than women who are not obese. The research results obtained are in line with research by Hanifah et al in 2018 and show that obesity is associated with the incidence of type 2 DM in women. In his research, the results showed that women with obesity were at risk of suffering from type 2 DM than women who were not obese (Ardiani et al, 2018). A case control study in the United States showed that women with a body mass index >25 kg/m² were at risk of suffering from type 2 DM than women who had a body mass index <25 kg/m². Women who are obese will have more cell mass that requires insulin compared to women who are not obese (Ibe & Smith, 2014).

RESEARCH LIMITATIONS

Every study has limitations. The limitations in this research that occurred when collecting data could cause bias, namely: First, there was a memory bias from respondents that emerged when collecting data for the variable history of gestational diabetes mellitus, the variable history of giving birth to a baby ≥ 4000 grams, and the variable physical activity. Second, they did not carry out a matching study in collecting age data and respondent address data.

CONCLUSION

In conclusion, this study shows that there is a significant relationship between hypertension, physical activity and obesity with the incidence of type 2 DM in women. This shows that there are still many women who are obese and lazy about exercising, and still consume too much food that contains a lot of salt. Therefore, people who are obese can start doing weekly physical activity, such as taking part in gymnastics activities held by the Pejuang Community Health Center, and can further reduce salt consumption, such as not adding too much salt to food or reducing salty foods.

AUTHOR CONTRIBUTIONS

OM as concept preparation, original draft writing, investigation, and data analysis. YF as supervised and reviewed the writing.

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