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RESEARCH ARTICLE

Obesity as Risk Factor of Type 2 Diabetes Mellitus in Women of Childbearing Age

Hanifah Ardiani,[1] Soeharyo Hadisaputro,[2] Djoko Trihadi Lukmono,[2] Heri Nugroho,[3] Antono Suryoputro[4]

[1]Study Program of Public Health, STIKES Bhakti Husada Mulia, Madiun, Indonesia, [2]Study Program of Master of Epidemiology, Postgraduate School, Universitas Diponegoro, Semarang, Indonesia, [3]Department of Internal Medicine, Faculty of Medicine, Universitas Diponegoro/Dr. Kariadi General Hospital, Semarang, Indonesia, [4]Department of Health Policy and Administration, Faculty of Public Health, Universitas Diponegoro, Semarang, Indonesia

Abstract

Women of childbearing age with type 2 diabetes mellitus (DM) are more at risk of having pregnancy complication (in both the mother and the baby) at twice the risk for sexual dysfunction and three times more likely to di than women of childbearing age without DM. The purpose of this study was to prove obesity as the risk factor of type 2 DM in women of childbearing age. The study design was a case-control and a qualitative analysis using the in-depth interview. This study conducted in Internal Medicine Polyclinic and Eye Polyclinic in Regional General Hospital Madiun, June–July 2017. The population in this study was women of childbearing age 20–49 years old and married who check blood sugar in Regional General Hospital Madiun. The samples of this study were 54 cases and 54 controls using consecutive sampling. Data analyzed by chi-square and logistic regression. The results showed that obese women of childbearing age had risk 2.63 times greater for type 2 DM than non-obese (p=0.016, 95% CI=1.06–6.53). In conclusion, obesity was a risk factor of type 2 DM in the women of reproductive age.

Keywords: Diabetes, obesity, women of childbearing age

Obesitas sebagai Faktor Risiko Diabetes Melitus Tipe 2 pada Wanita Usia Subur

Abstrak

Wanita usia subur (WUS) dengan diabetes melitus (DM) tipe 2 lebih berisiko mengalami komplikasi kehamilan (baik pada ibu maupun bayinya), berisiko 2 kali lebih besar untuk menderita gangguan fungsi seksual, dan 3 kali lebih besar untuk mengalami kematian dibanding dengan WUS tanpa DM. Tujuan penelitian ini membuktikan obesitas sebagai faktor risiko DM tipe 2 pada WUS. Desain studi dalam penelitian ini adalah kasus kontrol yang diperdalam dengan analisis kualitatif menggunakan wawancara mendalam. Penelitian ini dilakukan di poliklinik penyakit dalam dan poliklinik mata RSUD Kota Madiun Juni–Juli 2017. Populasi dalam penelitian ini adalah WUS berusia 20–49 tahun dan sudah menikah yang diperiksa gula darah di RSUD Kota Madiun. Sebanyak 54 kasus dan 54 kontrol dipilih menggunakan *consecutive sampling*. Data dianalisis dengan *chi square* dan regresi logistik. Hasil penelitian menunjukkan bahwa WUS yang obesitas memiliki risiko 2,63 kali lebih besar untuk mengalami DM tipe 2 dibanding dengan yang tidak obesitas (p=0,016; 95% IK=1,06–6,53). Simpulan, obesitas merupakan faktor risiko DM tipe 2 pada WUS.

Kata kunci: Diabetes, obesitas, wanita usia subur

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Correspondence: Hanifah Ardiani. Study Program of Public Health, STIKES Bhakti Husada Mulia. Jln. Taman Praja No. 25, Madiun 63139, East Java, Indonesia. E-mail: ardiani.hanifah@gmail.com

Introduction

Women of childbearing age are women aged 15–49 years who have reproductive organs which still works fine easier to get pregnancy.[1] If the women of childbearing age to suffer from type 2 diabetes mellitus, then it will be more at risk to experience complications of pregnancy, both in the mother or her baby.[2–4] Data January 2016–March 2017 in Regional General Hospital Madiun, showed 11 women of childbearing age with type 2 diabetes mellitus (DM type 2) that maternity in Regional General Hospital Madiun and everything maternity with a cesarean section.

Some women of childbearing age also to suffer complications, including five women, have hypertension and one person suffered amniotic rupture early. Also, there are complications in infants, namely two abortion, a baby is born with high weight, one baby has a low Apgar score, one baby undergoes intrauterine fetal death (IUFD), and one baby undergoes intrauterine growth restriction (IUGR).[5] Women of childbearing age two times greater to suffer from sexual dysfunction than women of childbearing age without DM with the incidence of 23.8%.[6] DM is also the leading cause of death in the United States in the women of childbearing age. Women of childbearing age with DM have three times greater risk for death compared with women of childbearing age that have not experienced DM.[7] Fifty four percent of women of childbearing age not pregnant in Pensylvania (15–45 years) experiencing overweight and obesity.[8] Obesity associated with an increase in the release of free fatty acids secreted from adipose tissue and can interfere with the absorption of glucose into muscle cells because of the competitive barriers.[9] Obesity also associated with the secretion of adipokines which regulates insulin sensitivity through the tumor necrosis factor alpha, interleukin-6, adiponectin, resistin, and leptin.[10] According to research conducted in Indonesia, the women of childbearing age are obese have 2.8 times greater risk for suffering a DM than women of childbearing age, not obesity (95% CI=2.20– 3.50).[11]

Type 2 DM on the women of childbearing age is an important issue because it has a significant impact. Research on the relationship of obesity with type 2 DM on women of childbearing age still rarely performed, even the research that has been conducted in Indonesia still cross-sectional study design. Thereby, studies the relationship of obesity with type 2 DM on the women of childbearing age with a design case study with qualitative analysis deepened control using in-depth interviews. The purpose of this research was to prove obesity as a risk factor for incidence of type 2 DM on women of childbearing age.

Methods

This study used the mixed method with case-control design study and the qualitative analysis using in-depth interviews. This research was conducted at the Eye Clinic and Internist Clinic in the Regional General Hospital Madiun in June–July 2017. The population of this research were all the women of childbearing age aged 20–married 49 years and had blood sugar examined in the Regional General Hospital Madiun. The sample in this study newly diagnosed DM in an internal medicine clinic based upon examination of the blood sugar as the case group and who have not diagnosed DM as the control group. The sample was selected using consecutive sampling method with 54 cases and 54 controls. Samples for qualitative analysis, i.e., respondents from the closest person (family) to confirm the answers of the respondents for validating through triangulation method. The simple random sampling method for qualitative analysis. The number of samples for qualitative analysis is 10% of the total sample for the quantitative method, six from the cases group and six people from the control group.[12]

DM was diagnosed based upon the criteria Perkeni years 2015, namely blood glucose during the examination (GDS) ≥200 mg/dL with a classic complaint (polyphagia, polyuria, polydipsia and weight loss without definite cause) to the group case. The control group upheld the results of blood sugar during capillary <90 mg/dL as well as without the classic complaint.[13] Obesity is enforced using a body mass index (BMI), with the formula weight in pounds divided height squared in meters.[14] BMI in research is categorized into three, that is normal (≤25 kg/m$_2$), overweight (>25–27 kg/m$_2$), and obesity (>27 kg/m$_2$).[15] Data analyzed using chi-square to bivariate followed by regression logistics by the method of Backward LR to see the influence of several factors together (multivariate). The content analysis used for qualitative analysis.

This research has got ethical clearance from Health Research Ethics Commission (KEPK) of Faculty of Medicine, Universitas Diponegoro

Semarang with number: 333/EC/FK-RSDK/VI/2017.

Results

Characteristics of respondents in this study are shown in Table 1. Table 1 shows that respondents aged ≥35 years and respondents with hypertension found more on groups of cases compared to the control group (28% vs 24%). Likewise with respondents who have a family history of DM (63% vs 37%) and respondents with obesity (46% vs 24%).

Table 2 shows that there was a relationship on the history of gestational diabetes mellitus (GDM) and obesity with type 2 DM on women of childbearing age. Obese reproductive age women had 2.7 times greater (95% CI=1.19–6.18) risk to suffer type 2 DM compared to reproductive age women with healthy weight. Women of childbearing age that have a history of GDM had a risk of 2.15 times higher (95% CI=1.74–2.65) suffering from type 2 DM compared with women of childbearing age which did not have a history of GDM. Variable hypertension, overweight, and age did not correlate with the incidence of type 2 DM on women of childbearing age. The variable to be included in the analysis of multivariate is a variable that has a value of 0.25, i.e., p<GDM history, obesity, and age.

Table 3 shows that obesity and age was a risk factor of Genesis of type 2 DM on reproductive age women. Obese reproductive age women had 2.63 times greater risk of experiencing a DM type 2 compared to the normal (95% CI=1.06–6.53). Women aged ≥35 years had 6.63 times greater risk experiencing than type 2 DM with the <35 years old (95% CI=2.23–19.70).

Finding of the qualitative analysis show the reason as stated by one of the respondents:

"Before diagnosed of diabetes, I never diet. Indeed fatter anyway, but it's very hard to diet. I am easy hungry, eating potluck, and also can not be picky. I started controlling the food since diagnosed diabetes. I reduced the portion of rice and reduce sweet drinks. I'm still not exercise, due to illness of diabetes so easily tired. I also do not know if that excess weight can trigger diabetes."

Table 2 Factors Related to the Incidence of Type 2 DM on Childbearing Age Women

Variable	OR	95% CI	p Value
Hystory of GDM	2.15	1.74–2.65	0.006**
Hypertension	1.21	0.51–2.87	0.661
BMI status			
Overweight	0.78	0.29–2.07	0.620
Obesity	2.72	1.19–6.18	0.016**
Age ≥35 years	2.06	0.88–4.80	0.092*

Description: *=variables become candidates in logistic regression test (p<0.25), **=variable associated with the dependent variables (p<0.05) and was a candidate in the logistic regression test

Table 1 Characteristics of Respondents

Characteristics	Cases		Controls	
	Frequency (f=54)	Percentage (%)	Frequency (f=54)	Percentage (%)
Age (years)				
≥35	47	87	29	54
<35	7	13	25	46
Hypertension				
Yes	15	28	13	24
No	39	72	41	76
Family history of DM				
Yes	34	63	20	37
No	20	37	34	63
BMI status (kg/m$_2$)				
Obesity (>27)	25	46	13	24
Overweight (>25–27)	9	17	11	20
Normal (≤25)	20	37	30	56

Table 3 Factors with Effect on the Incidence of Type 2 DM on Reproductive Age Women

Variable	B Value	p Value	ORadj	95% CI
Obesity	0.968	0.037	2.63	1.06–6.53
Age ≥35 years	1.892	0.001	6.63	2.23–19.70
Constanta	−1.893			

Discussion

Results showed that obesity associated with the incidence of type 2 DM on women of childbearing age, but overweight did not show any relation. The results of the multivariate analysis showed that the risk of having obese women of childbearing age 3.09 times more likely to suffer from type 2 DM compared with the women of childbearing age BMI-his normal or overweight.

The results of this study following research conducted in Indonesia. Women of childbearing age with obesity have 2.8 times greater risk of suffering from type 2 DM compared with women of childbearing age are not obese (95% CI=2.20–3.50).[11] The results are also consistent with research conducted in Norway, women with BMI 25.0–29.9 kg/m$_2$ and ≥30.0 kg/m$_2$ has a risk of 3.52 times (95% CI=2.63–4.73) and 9.97 times greater (95% CI=7.38–13.00) experienced DM type 2 compared with women of childbearing age that have the BMI 14.5–24.9 kg/m$_2$.[16] A case-control study conducted in the United States suggests that women who have the BMI >25 kg/m$_2$ have a 3.57 times greater risk of experiencing a DM type 2 compared to women who have the BMI ≤25 kg/m$_2$ (95% CI=3.52–3.63).[17] A prospective cohort study also proved that the BMI associated with the incidence of type 2 DM. Asian race women experience increased BMI 5 kg/m$_2$ for 20 years had a risk of 2.36 times to suffer from type 2 DM (95% CI=1.83–3.04).[18] Someone experiencing overweight will have a mass of cells that insulin needs more so that is also a lot more than people who are not obese. If the pancreas that produces insulin then the damage could not be produced in sufficient quantities. Therefore, an increase in insulin requirements will not be met so that the blood glucose concentration being high.[19]

People with obesity will experience an increased secretion of resistin. Resistin is a member of cysteine-rich proteins. A study in mice suggests that a decrease in serum resistin associated with increased insulin sensitivity. Studies in humans also show the same thing, that resistance associated with insulin sensitivity. Some studies show a positive correlation between resistin levels and insulin resistance.[19]

Obesity also associated with an increase in the release of free fatty acids. Free fatty acids will interfere with the absorption of glucose into muscle cells.[20] Besides, obesity also associated with adipose tissue that acts as an endocrine secretion organ including the secretion of adipokines. Adipokine regulates insulin sensitivity through the tumor necrosis factor alpha, interleukin-6, adiponectin, resistin, and leptin.[10]

The results of the in-depth interview show that almost all respondents (11 out of 12 respondents) stated that never go on a diet to reduce his weight. For groups of cases, they go on a diet after being diagnosed with type 2 DM, a diet that was only done to control eating patterns, accompanied by sports. They have resigned with her weight. They also did not know that obesity may be a risk factor for DM.

The results of this research also show that age was a risk factor for type 2 DM on women of childbearing age. Women of fertile age aged ≥35 years had a higher risk of experiencing 6.63 times DM type 2 compared to the <35-year-old. An increased incidence of DM closely associated with age. Influence of aging on Genesis DM type 2 occurs because of changes in the pancreatic β cells. The changes cause changes in insulin secretion and glucose metabolic changes associated with old age.[20] A research was done in the area of urban in Indonesia suggesting that women of childbearing age aged 35–49 years has 5.4 times greater risk of experiencing a DM compared with women of childbearing age aged 15–34 years.[11]

Obese women of childbearing age had a 2.63 times greater risk of developing type 2 diabetes than those who are not obese. Obese women of childbearing age should try to lose weight through regular diet and exercise regulation to avoid the risk of type 2 diabetes mellitus.

Conclusion

Obesity was a risk factor for DM type 2 in women of childbearing age.

Conflict of Interest

The authors declare no conflict of interests.

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