Type 2 Diabetes Mellitus Risk Factor Prediction Score Related to Blood Glucose Level in the Second and Third Trimester of Pregnancy

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ABSTRACT

Background: *Based on data from IDF (2016) every 6 seconds every a person dies due to DM. One of the seven pregnancies affected by gestational diabetes. And predicted by 2040,* One of ten adults *suffer DM (642 million). Based on the very poor data, it is very urgent to do prevention as early as possible, even before the baby is born during pregnancy.***Objectives:** *To identify and to analyze the value of DM type II risk factors and blood sugar levels in pregnant women of trimesters 2 and 3. This study involved 30 participants of pregnant women of trimester 2 and 3 who were given questionnaires of DM type II risk factors and measured Fasting Blood Glucose (FBG).* **Results:** *Results obtained with α 0.01 is 0.00 with r = 0.880 which means there is a significant relationship between DM type II risk factor and the level of Fasting Blood Glucose (FBG) which strong relationship.* **Conclusion:** *Expected follow-up of cohort studies, for pregnant women who have high risk factors and high blood sugar levels associated with the incidence of DM in pregnant women.*
Keywords: Risk Factor, Blood Glucose, Type 2 DM, Pregnant Women

INTRODUCTION

Diabetes Mellitus is a chronic condition characterized by an increase in glucose concentration with the appearance of typical main symptoms, namely urine that taste sweet in large numbers (Bilous, 2015). Diabetes is a major health problem because its complications are short-term and long-term. Starting from tip of hair to toe. Complications concerning the various organs of the body are sepecial concern from WHO as well as from the organization of diabetes worldwide to perform various prevention of the onset of DM disease (Soegondo, Soewondo, Subekti, 2014).

Based on data from IDF (2016) every 6 seconds a person dies because of DM. One of the seven pregnancies, affected by gestational diabetes. Predicted by 2040, One of ten adults suffer DM (642 million). DM prevalence in Indonesia is ranked 4th in the world based on interview in 2013 that is 2.1% (Kementerian Kesehatan RI, 2014). Prevelance of diabetes on men is higher than woman, however if we observe from the number of patients, women is higher. Pregnant women who have diabetes mellitus in the United States reaches 4% with 88% are gestational diabetes, while 12% are pragestational diabetes. For Indonesia, WHO predicts an increase in the number of patients from 8.4 million in 2000 to about 21.3 million by 2030 (Hermanto, 2012). With the prediction is increasing from year to year it is very necessary to be prevented through various ways.

Starting from self-management, to family involvement in preventing the onset of DM and its various complications (Soegondo, Soewondo, Subekti, 2014).

Basically, these complications arise as a result of high blood sugar levels are not controlled in the long term, so it can be detected any complications after suffering from DM more than five years. Type DM itself many complications, those are T2DM and Gestational diabetes (GDM) (in the mother and baby) (Soegondo, Soewondo, Subekti, 2014).

The occurrence of GDM parallels the prevalence of impaired glucose tolerance (IGT), obesity, and type 2 diabetes mellitus (T2DM) in a given population. These conditions are on the rise globally. Moreover, the age of onset of diabetes and pre-diabetes is declining while the age of childbearing is increasing. There is also an increase in the rate of overweight and obese women of reproductive age; thus, more women entering pregnancy have risk factors that make them vulnerable to hyperglycemia during pregnancy (Hod *et al* ,2015). According to the world diabetes organization (IDF), Gestational diabetes (GDM) is a form of diabetes where blood sugar levels persist during pregnancy. GDM appears on one of 25 pregnancies worldwide and it is associated with complications in both mother and baby. Gestational diabetesmellitus (GDM) is associated with increased risks to mother and child, but globally agreed diagnostic criteria remain elusive. Identify women with GDM are important, as treatment reduces adverse outcomes such as perinatal death, shoulder dystocia and neonatal hypoglycaemia (Meek et al, 2015). GDM usually disappears after pregnancy, but women with GDM and their children will be at a higher risk of developing type 2 diabetes later in life. It is estimated that half of women with GDM will develop type 2 diabetes within five to ten years after delivery. Efforts to prevent DM will be better if started from before this disease emerged, ie during pregnancy before the baby was born with a genetic disorder carrying DM. Until now, prevention of DM in pregnant women felt very less attention, whereas people with GDM increasingly longer.

METHODOLOGY

This research design using quasi experiment with treatment in the form of examination of fasting blood glucose level (FBG). Performed by risk assessment of T2DM in all participants of pregnant women of trimester 2 and 3, then checked FBG levels. The population in this study were 30 pregnant women of trimester 2 and 3 at Permata Bunda Hospital and private practice midwife. Time of research commences from April to August 2017. Samples are used in accordance with inclusion criteria by purposive sampling. The inclusion criteria of the study participants were: trimester 2 and 3 pregnant women aged between 25-45 years old, willing to be participant in research and follow research procedure (8 hours fasting).

Variable in this research consist of independent variable value of risk factor of T2DM while the dependent variable is Fasting Blood Sugar Level. In this study, data collection was done by using questionnaire instrument of standard risk factor value and recommended by IDF. While the measurement of blood glucose levels will use a high quality Blood Sugar Examination tool and guaranteed validity using the brand On Call Platinum[tm] (Figure 1). Data analysis using unpaired T test by performing normality data test first. Test tool with statistical program with computer. Interpretation of result H0 is accepted if p> 0,01.

Research that uses humans as subjects should not conflict with ethics. The purpose of this study should be ethical in researching has submitted a request to the relevant research committee at the research site. Research ethics in question here are: Inform

Consent, Anonimity, Confidentiality. This research has been declared ethical by Ethics Committee of University of Muhammadiyah Malang with number E.5.a / 091 / KEPK-UMM / V / 2017.

Figure 1 Fasting Blood Glucose Measurement.

RESULTS AND DISCUSSION

Based on the results of research conducted on 30 participants, can be known some aspects related to gestational diabetes. In general data it is found that most (70%) participants work as housewives and half of them are junior high school. Based on the age of pregnancy in the Trimester, most participants entered in Trimester 2 that is 18 people (60%). Whereas in the week of pregnancy, a minority of 20% had 28 weeks' gestation.In the special measurement data of risk factor values, the average value of T2DM 8.1 is included in the moderate category. In the measurement of blood sugar characteristic the minimum value was 64 mg / dL and the maximum value was 175 mg / dL, Average 108.17 mg / dL is still classified as normal.

In the specific data measurement of risk factor values, obtained based on the classification of risk factors obtained almost half (47%) belong to the low classification, where within 10 years the possibility of DM is 1 of 100 individuals. While the average value of T2DM risk factor 8.1 is included in the risk category increased, 1 of 25 individuals. On the measurement of blood glucose characteristic, it was found that the minimum value of 64 mg / dL and the maximum value of 175 mg / dL, with an average value of 108.17 mg / dL is still normal (Table 1).

Table 1: Relationship between T2DM Risk Factor Score and FBG

Risk Factor Score	Risk Classification		Number	%
<7	Low Risk		14	47
7-11	Risk increase		7	23
12-14	Moderate Risk		9	30
Variable	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
FBG	64	175	108.17	27.553
Variable	**α**		**Sig. (2-tailed)**	**Pearson Correlation**
Risk factor and dan FBG	0.01		0.00	0.880

Some assessment items that show the characteristics of respondents in terms of T2DM risk factors are the age of the respondents. Where all respondents have age below

45 years, therefore the risk is quite small. This is in accordance with the study of risk factors for type 2 diabetes, ie people under the age of 45 years in the cohort study have lower risk factors for DM than those age above 45 years. Based on physical activity performed, some participants are less in physical activity. Physical activity referred to here is physical activity of at least 30 minutes during work or leisure (Lindström, Tuomilehto, 2003). During pregnancy, hormonal and metabolic changes occur. Metabolic changes characterized by elevated levels of glucose in the blood due to the fulfillment of energy needs for mother and fetus. Hormonal changes are characterized by increased hormone estrogen and progestin hormone. Increased hormone estrogen and progestin hormones resulted in the state of the number or function of maternal insulin is not optimal and there is a change of insulin kinetics and resistance to the effects of insulin. The effects of this insulin resistance result in high blood sugar levels of pregnant women so that gestational diabetes occurs (Saldah, 2012).

According to researchers, less physical activity and only moves as necessary alone will lead to bad things for health and vulnerable to obesity and insulin receptor insensitivity. This is reinforced by the results of research stating that, obesity is a factor that is very instrumental in the occurrence of GDM and T2DM in the future (Hod *et al* ,2015). Based on the principle of self-management of DM (Smallwood, 2009), exercise or physical activity is needed to increase insulin sensitivity and help the process of entry of glucose into the cell, thus reducing blood sugar levels (Wang et al, 2013 and Kent et al, 2013). In pregnant women, especially stepping on trimester two and three, where weight increases, in addition to the growing fetus also due to increased metabolism during pregnancy. This will lead to obesity that is not realized by the mother and good lifestyle management needs to be done (Hod *et al* ,2015). Required regular physical activity, that is by doing gymnastics pregnant at least twice a week, so that in addition to the body feels fresh, the needs of activities required by the muscles remain met, and in the end metabolic processes in the body can run properly, blood glucose breaking, blood circulation Smooth, the heart works well, and the mother has enough energy for cell regeneration and fetal formation.

In addition to physical activity, another item in the risk factor assessment item of T2DM is the consumption of vegetables and fruits. In some participants who have a rather high risk factor value is due to lack of consumption of vegetables and fruits. Healthy foods with high fiber and full of vitamins and minerals are needed to help bind the free fat present in the body, so that metabolism can work well and avoid the accumulation of bad fats or commonly called LDL (Wang et al, 2013). This is in line with the International Federation of Gynecology and Obstetrics (FIGO) gimmicks related to GDM initiatives, that good self-management is a solution as well as prevention against future Type 2 DM (Wang et al, 2013).

The results showed a strong association between the assessment of risk factors for type 2 diabetes mellitus (r = 0.880), in which the researchers analyzed numerically the results between risk factors and blood sugar levels. In this study, the higher the DM risk factor score followed by the higher FBG levels of participants. Indeed, if the value of each variable is classified, still classified as normal, both the risk factor score and blood sugar levels, but this can not be allowed, because there is no further study in a cohort associated with high risk factors during pregnancy with the occurrence of T2DM in the future.

There is a strong correlation between risk factor of T2DM with blood sugar level of pregnant women of trimester 2 and 3 that is 0,00 (p = 0,01) and r = 0,880. Based on the results of this study, assessment of risk factors for T2DM should be done to pregnant women of trimester 2 and 3 as an indicator or reminder that type 2 DM can be prevented as early as possible and the incidence of T2DM in the future could be further down.

For further research, it is suggested to investigate further cohortally and true experimental in relation to risk assessment and future DM events. In addition it is also necessary preparation of T2DM risk assessment tool specific to pregnant women therefore it can be more accurate in predicting the incidence of T2DM after pregnancy.

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