Adverse Pregnancy Outcomes in Pregnant Women with Gestational Diabetes Mellitus

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Abstract: *Gestational diabetes mellitus have multiple risk factors among women with gestational diabetes and their babies. This study done to explore the adverse pregnancy outcomes among women with gestational diabetes and to investigate the effect of Oral Glucose Tolerance test (OGTT) parameters and other outcome measures on adverse pregnancy outcomes. The study was conducted in 2018, using two articles the one is (Feng et al. 2017) and the other is (Ding et al, 2018). World Health Organization (WHO) and International Association of Diabetes an Pregnancy Study Group (IADPSG) made a criteria to diagnosis the Gestational diabetes mellitus by Oral Glucose Tolerance test (OGTT) using Fasting Plasma Glucose sample and 1-Hour, 2-Hours Plasma Glucose. The high values of Oral Glucose Tolerance test (OGTT) in Fasting Plasma Glucose was associated with most conditions of Gestational diabetes mellitus and we recommended that thus women should follow treatment provided, diet and exercises as soon as possible and continually.*

Keywords: Gestational Diabetes Mellitus, Adverse pregnancy outcomes, Risk factors, Oral Glucose Tolerance test, Fasting Plasma Glucose.

I. INTRODUCTION

Gestational diabetes mellitus (GDM) defined as elevated of maternal blood sugar that is detected during second or third trimester of the pregnancy (Ding et al., 2018). Occurs when a placental hormone prevents the body from utilizing insulin. The placenta delivers nutrients and water to the fetus and creates a wide range of hormones to maintain the pregnancy going .Estrogen, cortisol and lactogen are example of hormones that block insulin. With the growth of the placenta, more of these hormones are produced and insulin resistance is increased. Multiple risk factors associated with GDM for mother and child known as adverse pregnancy outcomes (APO). For maternal associated with high blood sugar, a family history of type 2 diabetes as well as hormone disorders like polycystic ovary syndrome and in the fetus associated with macrosomia, congenital and metabolic abnormalities. Screening tests for GDM mellitus done between 24 - 28 weeks of pregnancy. The World Health Organization (WHO) made a criteria to diagnose GDM, the oral glucose tolerance test (OGTT) should be carried out with 75g anhydrous glucose in 250ml to 300ml of water after fasting overnight of 8 to 14 hours, gestational women who satisfy the criteria for impaired OGTT are classified as having GDM , International Association of Diabetes an Pregnancy Study Group (IADPSG) made a criteria too, in order to determine GDM, (OGTT) should performed in fasting state using 75g of glucose at 24 to 28 weeks and GDM diagnosed when fasting plasma glucose (FPG) results above (5.2mmol/l) and 1-hour results above (10mmol/l) and 2-hours results above (8.5mmol/l), (Rani, 2016). GDM when diagnosed, most of doctor's recommended extensive diet and exercise. It found that 70 to 85% of cases can be controlled with lifestyle modifications (Kelley, Carroll and Meyer, 2015).

And our PICO question is "Do pregnant women with GDM have more APO compare to normal pregnant women?"

Search Strategies

In order to answer our PICO question, we used Google browser to search for studies, search done in one database "MEDLINE" PubMed engine. We used the terms (GDM, OGTT and risk factors. We got 630 articles, after filtration: Text availability (full text), Publication dates (5 years), species (human) and language (English) ending of 207 articles. We choose two cohort studies, one is published in 2016 (Feng et al. 2016), the other is published in 2018 (Ding et al. 2018). Those two studies are suitable with PICO question. Both our searches discuss abnormal glucose values and its relation to APO in women having GDM. We also read other articles to strength our statement. We read both articles in full and the apprising evidence worksheet filled, analysis for the data to check the methodology qualities of articles done. Both of our articles analyzed using ''SIGN'' Scottish Intercollegiate Guideline Network.

Analysis of the appraisal:

1) In the study (Feng et al. 2017). We come after the analysis of appraisal with following: the terminologies to reach to an answer for our question are present on the study addresses, the title reflect the relationship between women with GDM and APO and the study reach to valid answers. The two groups been under this study have same characteristics. The study indicates how many participants studied in each group, it shown that first group consist of 2927 pregnant women with GDM (19.86%) and other group consist of 11814 pregnant women with normal OGTT values. A clear analyses are done to assess the impact of outcome measures on the pregnant women with GDM. At the beginning of this study 15194 pregnant women were included, after that the study exclude 253(1.7%) women with multiple pregnancy and 200(1.3%) with presentational or overt diabetes. There is no mention

that exposure status has been considered on women who been excluded. The outcomes of the study are explained and the impact of each outcomes measure have shown its relationship on APO. The process measures are detailed across both groups, and are similar for each one, it state each outcomes measures and its impact on pregnant women with GDM. The measures which used on study are defined and have a known degree of accuracy, the study uses WHO and IADPSG criteria's. The grants from the world Diabetes foundation support this study. In addition, (Metzger BE et al. 2008). (Metzger et al. 2008) and (Uvena-Celeberzze et al. 2002) are studies include evidences which validate the reliability of the method and assessment which used in our studies. Exposure level have not mention on this study because this is retrospective

study. There are prospective confounders are identified in the assessment such as: previous GDM, previous macrosomia and psychological factors which may have an effect on the delivery mode. The study have shown analyses to minimize the risk of these confounders. We believe that this study prove the association between the exposure status and the expected APO. The results of this study are applicable to pregnant women with GDM. At the end of study, authors come with following: first, with the increase of hyperglycemic values in OGTT and FPG, there was an increase on APO. We come out from this study that OGTT and FPG are the most indicators of GDM. Women with GDM should follow insulin treatment, diet and exercises in order to avoid APO.

Table of evidence: for the first study (Feng et al. 2017)

Author/ year	Study aim	Study design	participants	intervention	Outcome measures	results	limitation
(Feng, et al, 2017)	**Aim:** the study aimed to look over the relationship between variable oral glucose tolerance test (OGTT) results and adverse perinatal outcomes. **Purpose:-** evaluation how varying OGTT characteristics relate and effect on adverse pregnancy outcomes and to decide or specify which OGTT variable related with certain adverse pregnancy outcomes.	Retrospective Cohort study	14,741 pregnant women	Pregnant women diagnosis with GDM (n=2927)(19.86%) divided into three groups: Group I, Group II, and Group III which consisted of patients with one, two, and three abnormal glucose values, respectively **Versus** Pregnant women with normal OGTT results. (n=11814)(80, 14%)	*OGTT *FPG *gestational age at delivery, * cesarean delivery rate, macrosomia, LGA, SGA, and preterm birth *odds ratios	* The adverse pregnancy outcomes with GDM patients were significantly more serious than non – GDM patients. *Adverse pregnancy outcomes and neonatal complications are more common and prevalence in group 2 of GDM patients than group 1. In addition, group 3 illustrates increasing in adverse pregnancy outcomes and neonatal complications compared to group 2. *odds ratios for non-GDM group and abnormal glucose parameters were increased in thus the adverse pregnancy outcomes become stronger. With more strong association in group 3. *GDM women with abnormal 2 OGTT in subgroup II observed to have more adverse pregnancy outcome than subgroup I *women with GDM who have higher FPG are more noticed to have adverse pregnancy outcomes	1-The patients who this study examine and study on agreed on some form of intervention involve diet, exercise and insulin treatment. For that it was realistic say that if they not got appropriate treatment, GDM mothers with their offspring would get more complications of adverse pregnancy outcomes. 2- the diet and nutrition that participants follow could have an effect on fetal growth with other perinatal complications, but this study did not data to cover these outcomes measures.

2) In The study (Ding et al, 2018). After analyzing we end with following: the elements needed to find answers for our question are present on the study addresses, the study front-page express the relationship between women with GDM and APO and at conclusion the study reach to reliable answers. The two groups of participants have same characteristics, first group consist of 1601(49.7%) women with APO and second group include 1620(50.3%) pregnant women without APO. explanation were presented to determine the effect of outcome measures on pregnant women with GDM. Initially 3702 pregnant women were included, after that the study drop out 421(11%) women without OGTT or delivery data and 60(1.6%) with presentational or overt diabetes. And the study did not mention that the exposure status considered on those pregnant women. The final results of the study are explained and the effect of each criteria have shown its association on APO. The process measures are detailed across both groups, and are similar for each other, it state

clearly each outcomes measures and its predicted result on pregnant women with GDM. The criteria which used have a known degree of accuracy, the study uses WHO and IADPSG criteria's in its analyses. The ethics committee of West china second university hospital and Sichuan support this study. In addition, (Shi, et al, 2016) and (Legardeur et al., 2014) are studies prove the method and outcomes of this study. Because this is a retrospective study the prognostic factor have not assessed. In this study there are confounders and considered in assessment like some collinearity problem was identified among FPG and OGTT. But there were logistic regression analysis for controlling them (table on the article (Ding et al. 2018)) and the study express confounders and its effect on APO. We believe that this study explain the relationship between the exposure status and APO. The results of this study are applicable to pregnant women with GDM on Chinese population. At the end of the study, the authors came with the following: First, there are certain factors that are

capable to effect the incidence of the APO. They observed that there is a direct relationship between (FPG and 2-h OGTT) values and APO in which FPG is more effective. As well as, increase the number of abnormal OGTT values have direct relationship with perinatal adverse outcomes. Therefore, we come out that it is better to provide management for pregnant women with GDM to avoid APO so they be under control.

Table of evidence: for the second study (Ding et al. 2018)

Author/ year	Study aim/purpose	Study design	participants	intervention	Outcome measures	results	Limitation of study
(Ding, et al, 2018)	**Aim**: this study aim to search on the effect of oral glucose tolerance test on adverse pregnancy outcomes and to determine what women with GDM face up from adverse pregnancy outcome. **Purpose**: the study purpose is to analyze the influence of each OGTT variables on the adverse pregnancy outcomes and research what are the risk factors that women with GDM facing. Also the study aim to investigate the association or the link between the number of OGTT values and adverse pregnancy outcomes	Retrospective cohort study	3221 pregnant women with GDM	Women with adverse pregnancy outcomes (no= 1601) (49.7%) divided into three groups: Group I, Group II, and Group III which consisted of patients with one, two, and three abnormal glucose values, respectively Versus Women without adverse pregnancy outcomes (no= 1620) (50.3%)	*FPG * 1-h OGTT, 2-h OGTT * antenatal insulin treatment (AIT) *Maternal and pregnancy variables.	*Both FPG and 2-h OGTT were significant predictors for adverse outcomes in the women with GDM after monitoring for maternal age, gravidity, days of pregnancy, gestational weight pain, history of abnormal pregnancy, family history of diabetes, and the number of antenatal visits. Thus, FPG had stronger association with the adverse pregnancy outcomes than 2-h OGTT. group 2 shown higher incidence in gestational hypertension, full term low weight infants and AIT than in group 1. Whereas, group 3 detected high incidence of adverse pregnancy outcomes compared to group 1; and the incidence of adverse pregnancy outcomes were higher in group 3 than those group 2. adverse outcomes increased with the number of abnormal OGTT values.	1) Body mass index (BMI) is a major reflection on nutrition diet been followed by participants, and elevation on the reading of BMI of pre-pregnant is a risk factor for GDM. Due to the deficiency of correct pregnancy weight with other needed data, this study could not determine the impact of BMI on adverse pregnancy outcomes. 2) It was difficult for the study to detect the relationship between each adverse pregnancy outcome and the specific values at three parameters of OGTT and this is due to the specific blood glucose values were not enough. 3) The study results may be appropriate to apply on Chinese only, because this is a single center retrospective study.

II. DISCUSSION

Both studies uses same participants but use different comparison group. Most likely both studies uses same intervention tools and methods for comparison, and have come out with at the end with similar results, and both has proven that pregnant women with GDM have more APO compare to pregnant women without GDM. After analyzing all accessible different intervention. Both studies agreed that FBG and OGTT are the most predictors for the APO on women with GDM. Pregnant women with GDM proved to have excessive risk of APO. And pearson chi-square test used to compare the APO between the subgroups of women with GDM. FPG have a positively effect on APO. OGTT values proved to have a strong association with rise of APO. A comparisons done to analyze the data using pair wise comparison and it show the following: occurrence of APO were presenting more on subgroup II than subgroup I. Also it show that the rate of many APO are elevated on subgroup III compare to subgroup I. Also the incidence of those APO are higher on subgroup III than subgroup II. Overall, the occurrences of APO have a direct relationship with the number of abnormal OGTT vales.

III. CONCLUSION

In conclusion of our researching, we found answers for our question and our study have important points to highlight: first, our intervention and outcome measures have shown that Maternal and pregnancy variables may lead to rick of APO. On other hand, the results of OGTT and FPG have shown that they are related to APO. Also, the more FBG and OGTT values the mother have, the worse of APO. We recommend that OGTT is the best direct test for diagnose of GDM, and those women should follow treatment provided, diet and exercises continually to avoid APO.

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