Metabolic Syndrome in Thai Women Previously Diagnosed with Gestational Diabetes

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Background: *The study of metabolic syndrome after delivery and its relationship to gestational diabetes (GDM) in Thai is lacking.*
Objective: *To compare the prevalence and risk factors of metabolic syndrome after delivery in GDM and normal pregnant Thai women.*
Material and Method: *A case-control study was performed at Thammasat University Hospital. Women with previous history of GDM (n = 56) and normal pregnant women (n = 51) delivered during 2007-2013 were enrolled. All of them underwent metabolic profile evaluation and 75 gm oral glucose tolerance test in 2013-2014. Risk factors of metabolic syndrome were assessed by logistic regression model.*
Results: *Women were recruited a mean of 2.97±1.15 years after delivery. Compared to the control group, the mean current age, median body mass index (BMI) before pregnant, current BMI, waist/height ratio and systolic blood pressure were significantly higher in GDM group. Metabolic syndrome was more in the GDM group (26.8% (15/56) vs. 7.8% (4/51), OR 4.3, 95% CI: 1.32-13.99). Only a BMI ≥25 kg/m^2 before index pregnancy was a significant independent factor for this condition (OR 7.18, 95% CI 1.79-28.80; p = 0.005). After delivery, GDM group had more insulin resistance, assessed by HOMA-IR, less insulin sensitivity assessed by Masuda index and QUICKI score and less insulin secretion assessed by HOMA-B, comparing to control group without metabolic syndrome.*
Conclusion: *Previously diagnosed GDM women have higher prevalence of metabolic syndrome after delivery. Obesity before pregnant is a strong independent risk factor for this condition.*

Keywords: *Gestational diabetes mellitus (GDM), Metabolic syndrome*

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Gestational diabetes mellitus (GDM) is defined as glucose intolerance which is first recognized during pregnancy[1]. The global incidence of GDM in pregnant women varies between 1.4-14% and is 7% in pregnant Thai women[2,3]. Known risk factors for GDM include a maternal age >35 years, obesity and a family history of type 2 diabetes mellitus (DM)[4]. The pathogenesis is the inability of pancreatic beta-cells to overcome increasing insulin resistance during pregnancy. Thus after delivery, one third of women with previous history of GDM developed type 2 DM[5].

The metabolic syndrome is a syndrome of metabolic derangements consisting of insulin resistance, hyperinsulinemia, abdominal obesity, dyslipidemia, hypertension, and a pro-inflammatory and prothrombotic state. It is also a significant risk factor for atherosclerotic vascular disease and type 2 DM[6,7]. Previous studies reveal the prevalence of metabolic syndrome after delivery can be as high as 49 and 60% in GDM women in Sri Lanka and India, respectively[8]. While in China and Turkey the prevalence is around 25%[8]. However, the impact of westernization and its associated life style changes may result in a rising incidence of the metabolic syndrome after delivery overtime.

To our knowledge, there have not been any studies of metabolic syndrome after delivery and its relationship to GDM in Thai women. The objective of this study was to compare the prevalence and risk

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factors of metabolic syndrome after delivery in GDM and normal pregnant women.

Material and Method

A case-control study was conducted at Thammasat University Hospital, Pathumthani, Thailand. Women with history of GDM (GDM group) and normal pregnant women (control group) who delivered during 2007-2013 were enrolled by random sampling in 2013-2014. GDM was defined by Carpenter and Coustan's criteria[9,10]. Our inclusion criteria were Thai women aged 18-50 years, who received antenatal care and delivered at Thammasat University Hospital at least 6 weeks after the index pregnancy. Exclusion criteria were known chronic diseases or conditions that affect body weight, glucose, and lipid profiles e.g. HIV infection, tuberculosis, active hepatitis, nephrotic syndrome, renal impairment, autoimmune disorders, Cushing's syndrome, depression and steroid usage.

Previous studies revealed a 3-fold higher prevalence of metabolic syndrome in women with prior history of GDM[11]. The estimated prevalence of metabolic syndrome in GDM and control group were 33% and 11%, respectively[12]. In order to have 75% power to detect a difference in metabolic syndrome prevalence between GDM and control groups with 95% confidence, at least 50 participants from each group is needed[13]. At the end of the study, we recruited 56 participants in GDM group and 51 participants in control group.

As per our hospital guideline, all participants in the GDM group were counseled by the diabetes care team consisting of the endocrinologists, internists, nutritionists and pharmacists throughout the index pregnancy while none of the control group was counseled by this team. Diet and life style modification was emphasized in the GDM group. The participants in the GDM group conducted self-monitoring of blood glucose, testing themselves 1-4 times/day from the time of GDM diagnosis until delivery aiming for preprandial, 1- and 2-hour postprandial glycemic targets of <95, 140 and 120 mg/dl, respectively[10]. All participants underwent physical examination and laboratory testing, as detailed below.

Anthropometrical examination

Body weight, height and blood pressure were measured in all participants and body mass index (BMI) was calculated. Waist circumference was assessed in the upright position without clothes. The landmark was the mid position between the rib margin and iliac crest[14]. Blood pressure in sitting position with the appropriate sized cuff was measured after 5 minutes of rest in a quiet room by calibrated sphygmomanometry.

Biochemical analysis

Fasting plasma glucose, HbA1C, lipid profiles, fasting c-peptide and fasting insulin level were evaluated in both groups. Subsequently, standard 2-hour 75-gram OGT tests were performed[10]. Insulin levels at 2-hour post oral glucose load was analyzed. Blood samples for insulin and c-peptide measurement were centrifuged immediately, stored in -80°C and analyzed at the end of the study. Plasma glucose level was analyzed by the Enzymatic hexokinase method with a Siemens DimensionRxL®. HbA1c was analyzed by high performance liquid chromatography with Arkray8180v (certified by Piper Doctor and Bio Calibration companies). The normal range of HbA1c was 4-6%. Total cholesterol, triglyceride, high density lipoprotein (HDL) and direct low density lipoprotein (LDL) measurement were evaluated by cholesterol oxidase method, enzymatic method, direct measure-PEG method and direct measure method with Siemens DimensionRxL®, respectively. Solid-phase, enzyme-labeled chemiluminescent immunometric assay (IMMULITE®) was used to evaluate insulin and c-peptide level.

Insulin resistance and beta-cell function was evaluated by Homeostasis Model Assessment of Insulin Resistance (HOMA-IR) and Homeostasis Model Assessment of β-cell function (HOMA-B), respectively[15,16]. Insulin sensitivity was evaluated by Matsuda index and Quick Insulin Sensitivity Check Index (QUICKI)[17,18].

Definitions

Metabolic syndrome was diagnosed if 3 out of 5 criteria are met, according to the American Heart Association/National Heart Lung and Blood Institutes (AHA/NHLBI) criteria[19], namely, waist circumference ≥80 cm, blood pressure ≥130/85 mmHg or on antihypertensive medication, fasting plasma glucose ≥100 mg/dL or on anti-diabetic medication, fasting triglyceride ≥150 mg/dL, HDL ≤50 mg/dL or on anti-hyperlipidemic medications.

Impaired fasting plasma glucose (IFG), impaired glucose tolerance (IGT) and diabetes mellitus (DM) were defined by the American Diabetes Association criteria[10]. The participants whose results revealed IFG and/or IGT would be defined as pre-diabetes[10].

Furthermore the Framingham 10-year risk score and Atherosclerotic Cardiovascular Disease (ASCVD) risk were assessed to predict the lifetime risk of cardiovascular disease[20,21]. Age, sex, race, smoking habit, presence of diabetes mellitus, systolic blood pressure, antihypertensive treatment, total cholesterol and HDL level were used to calculate those risk scores.

The present study was approved by Human Research Ethics Committee of Thammasat University No. 1 (Faculty of Medicine). Informed consents were obtained from all participants.

Statistical analysis

Data were analyzed with SPSS software (Statistical Package for the Social Sciences, version 13, Chicago, IL, USA). Continuous data and categorical data were presented in mean $\pm$ SD or median (range) and percent, respectively. The baseline characteristics, presence of metabolic syndrome, cardiovascular risk score and metabolic profiles were compared between GDM and control group using independent t-test or Mann Whitney U test for normal and non-normal, continuous data. Odds ratios with 95% confidence interval were used to measure association between outcomes of interest and GDM.

The authors compared metabolic studies (HOMA-B, HOMA IR, Matsuda index and QUICKI) and lifetime ASCVD risk score between subgroups by Analysis of Variance (ANOVA) or Post-Hoc analysis (Least Significant Method, LSD) was applied to compare the mean values of each subgroup to identify the significant mean difference. Risk factors associated with the metabolic syndrome were assessed by multiple logistic regression models. Factors included in the analysis were age, family history of DM, obesity and GDM. Statistical significance was defined as a *p*-value <0.05.

Results

A total of 56 and 51 participants in the GDM and control groups, respectively met the inclusion criteria. Women were recruited a mean of 2.97$\pm$1.15 years after delivery. The median index gestation was two. Compared to the control group, GDM women were significantly older, heavier and had a higher waist-height ratio. By contrast, weight gain during the index pregnancy was less in GDM group but both groups had similar weight gains after delivery (Table 1).

Most GDM participants (71%) were able to achieve the glycemic targets by life style modification while sixteen of them (29%) administered subcutaneous insulin during pregnancy and stopped after delivery. All participants did not smoke.

The current physical examination revealed that participants in GDM group had significantly more

Table 1. The index pregnancy data and current clinical characteristics in gestational diabetes and control group

Parameters	Gestational diabetes, n = 56		Control, n = 51		*p*-value
	Mean $\pm$ SD/ median	Range	Mean $\pm$ SD/ median	Range	
Current age (years)	38.6$\pm$4.0	29.3-47.5	33.0$\pm$4.7	22.9-42.1	<0.001
Weight before index pregnancy (kg)	59.0	39.0-80.0	52.0	41.0-80.0	0.014
BMI before index pregnancy (kg/m^2)	24.6	17.0-33.3	20.3	16.7-29.4	0.001
Weight gain during pregnancy (kg)	10.0	2.0-30.0	15.0	6.0-32.0	0.001
Weight gain after delivery[a] (kg)	3.0	(-10.00)-13.0	4.0	(-5.00)-14.0	0.644
Duration after delivery (years)	2.97$\pm$1.15	0.83-4.83	3.07$\pm$1.53	0.58-6.58	0.131
Current body weight (kg)	63.0	42.0-84.0	55.0	45.0-85.0	0.024
Current BMI (kg/m^2)	25.5	17.0-35.0	22.4	18.3-31.7	0.003
Current waist circumference (cm)	85.0	68.0-103.0	78.0	65.0-101.0	0.014
Current waist/height ratio	0.54	0.43-0.67	0.50	0.39-0.62	0.003
Current systolic blood pressure (mmHg)	120	100-155	110	100-140	0.002
Current diastolic blood pressure (mmHg)	70	60-91	60	60-80	0.092

BMI = body mass index

p<0.05 defined statistical significance

[a] Weight gain after delivery was calculated by current body weight-weight before index pregnancy.

body weight, body mass index, waist circumference and waist-height ratio (Table 1). Moreover, they also had higher systolic blood pressure.

The laboratory data after delivery (Table 2) showed that GDM group has significantly higher fasting plasma glucose, 2-hour plasma glucose after 75 gm OGT, HbA1c, total cholesterol and triglyceride comparing to control group. Fasting insulin and c-peptide levels were higher than those in control group but did not reach statistical significance. Although the mean Framingham's risk scores were 1 in both groups, the life time ASCVD risk in GDM group was significantly higher (39% vs. 27% in GDM and control group, respectively; $p = 0.041$).

The prevalence of metabolic syndrome after delivery in GDM group was 26.8% (15/56) versus 7.8% (4/51) in control group (OR 4.3, 95% CI 1.32-13.99). Only one woman in GDM group was firstly diagnosed of type 2 DM after delivery. Univariate analysis revealed significantly higher risk of pre-diabetes in GDM compared to control group (51.8% vs. 7.8%, OR 12.62, 95% CI 4-39.8) (Table 3). Obesity (BMI $\geq$25 kg/m^2) was also more frequent (41% vs. 7.8% in GDM and control group respectively, OR 8.19, 95% CI 2.6-25.9). Insulin usage was not a risk factor for metabolic syndrome among GDM group (OR = 1.36 95% CI 0.38-4.89). Multivariate analysis after adjusted with current age and family history of type 2 diabetes mellitus revealed that GDM was not a significant risk for metabolic syndrome but a pre-pregnant BMI $\geq$25 kg/m^2 was (Table 4). After delivery, we divided participants into four groups: control without metabolic syndrome (control/no MS; n = 47), control with metabolic syndrome (control/MS; n = 4), GDM without metabolic syndrome (GDM/no MS; n = 41) and GDM with metabolic syndrome (GDM/MS; n = 15). Metabolic parameters were compared between groups except in control/MS due to small number of participants

Table 2. Current biochemical profiles in gestational diabetes and control groups

Parameters	Gestational diabetes		Control		*p*-value
	Mean ± SD/ median	Range	Mean ± SD/ median	Range	
Fasting plasma glucose (mg/dL)	90.5	69-306	73.7	65-107	<0.001
2-hour plasma glucose after 75 gm oral glucose tolerance (mg/dL)	140.6	55-611	81.1	55.0-188.7	<0.001
HbA1C (%)	5.8	4.8-14.71	5.3	4.4-6.0	<0.001
Cholesterol (mg/dL)	205.3±42.0	132-291	186.8±36.5	120-279	0.017
Triglyceride (mg/dL)	136.38±144.0	22-915	89.52±54.4	25-178	0.026
High density lipoprotein (mg/dL)	54.3±13.0	30-88	57.1±12.8	28-77	0.266
Low density lipoprotein (mg/dL)	122.8±38.5	54.3-225.0	113.4±35.9	23-198	0.195
Fasting C-peptide (ng/ml)	1.5	0.6-12.4	1.2	0.5-4.7	0.084
Fasting insulin (uIU/ml)	5.4	2.0-46.6	4.4	2.0-28.8	0.495

Table 3. Prevalence of obesity, metabolic syndrome and pre-diabetes after delivery in gestational diabetes compared with control group

Factors	GDM (n = 56)	Control (n = 51)	Odds ratio	95% CI
Metabolic syndrome	15 (26.79%)	4 (7.84%)	4.30	1.32-13.99
BMI $\geq$25 kg/m^2	23 (41.1%)	4 (7.8%)	8.19	2.60-25.90
Waist/height ratio >0.5	46 (82.1%)	25 (49.0%)	4.78	1.99-11.50
Pre-diabetes[a]	29 (51.8%)	4 (7.8%)	12.62	4.00-39.80

GDM = gestational diabetes; CI = confidence interval; BMI = body mass index
Data were represented in number (%).
[a] Pre-diabetes was defined by either impaired fasting plasma glucose, impaired glucose tolerance or both.

(Table 5).

Post-hoc analysis revealed that GDM/MS group had the highest insulin resistance (HOMA-IR) and the least insulin sensitivity evaluated by Matsuda index and the QUICKI. Insulin secretion assessed by HOMA-B revealed less insulin secretion in both GDM groups vs. control. The ASCVD score was highest in the GDM/MS group.

Discussion

The present study has shown that a high pre-pregnant BMI was significantly associated with GDM and the metabolic syndrome after delivery. Although our study did not find GDM to be an independent factor for metabolic syndrome after delivery, this is a well-established risk factor[1].

Our cross-sectional study compared metabolic syndrome prevalence after delivery between previously diagnosed GDM and normal women. The mean period after index pregnancy was around 3 years with the range of 0.58 months to 6 years. The baseline characteristics revealed that women in the GDM group were older and more obese before pregnant. However, the GDM group had less weight gain during pregnancy. This might be a result of intensive life style counseling by the multidisciplinary diabetes education team. However, after delivery, the GDM group had a higher BMI, blood pressure, total cholesterol and higher prevalence of pre-diabetes. The prevalence of metabolic syndrome after delivery in the GDM and control group was 26.8% and 7.8%, respectively. Univariate analysis showed that previously diagnosed GDM possessed higher prevalence for metabolic syndrome after delivery (OR 4.3, 95% CI 1.32-13.99). Our rate of metabolic syndrome after delivery is relatively high. Due to obesity is common in Thailand, subsequently a

Table 4. Multivariate analysis of factors associated with the metabolic syndrome adjusted for age and family history of type 2 diabetes

Factors	Adjusted OR	95% CI	*p*-value
Previous gestational diabetes	4.25	0.85-21.35	0.079
Waist/height ratio	5.67	0.61-53.04	0.128
BMI $\geq$25 kg/m^2	7.18	1.79-28.80	0.005
Age $\geq$35 years	0.46	0.10-2.21	0.335

BMI = body mass index
Data were evaluated by logistic regression.

Table 5. Metabolic studies and atherosclerotic cardiovascular disease between subgroups

Parameters	GDM/MS n = 15	GDM/no MS n = 41	Control/no MS n = 47	*p*-value
	Mean $\pm$ SD/ median	Mean $\pm$ SD/ median	Mean $\pm$ SD/ median	
HOMA-B	81.2 [a]	60.3 [a]	166.9	0.029
HOMA-IR	1.85[a,b]	0.96	0.78	0.005
Matsuda index	4.46 [a]	8.20 [a]	14.67	<0.001
QUICKI	0.35$\pm$0.04 [a]	0.39$\pm$0.05	0.40$\pm$0.45	0.002
Lifetime ASCVD risk (%)	37.2 [a,b]	31.5	27.4	0.001

GDM = gestational diabetes; MS = metabolic syndrome; QUICKI = quantitative insulin sensitivity check index; ASCVD = atherosclerotic cardiovascular disease
Data were evaluated by ANOVA and median test, Post-Hoc analysis (least significant method)
[a] Significant difference compared with control/no MS
[b] Significant difference compared with GDM/no MS

high rate of this syndrome is, thus, expected[22]. This result is comparable to Caucasian but higher than other Asian countries[9]. More obesity, older age, genetic and environmental factors might account for the difference. Moreover, different GDM and metabolic syndrome diagnostic criteria might affect the result. At the time of the study, only one participant had been diagnosed with type 2 diabetes mellitus, over 4 years after delivery. The conversion rate to overt diabetes appears lower than in a Chinese study[23].

The authors also analyzed risks of metabolic syndrome and found that only obesity (a BMI $\geq$25 kg/m^2) before pregnant was a strong risk factor. A previous history of GDM was not the risk for metabolic syndrome after delivery, in accordance with other Asian studies[10]. This result might be explained by life style counseling in GDM group during pregnancy and also participants might have metabolic syndrome before pregnant. Thus GDM was a consequence of this syndrome.

Other risk factors for metabolic syndrome are insulin usage during pregnancy and smoking[24]. We could not evaluate the effect of smoking because all participants were non-smokers and we did not find an association between insulin usage during pregnancy and metabolic syndrome. In fact, GDM, metabolic syndrome and type 2 diabetes mellitus share the similar features, like increased insulin resistance with various degrees of insulin secretion, increased vascular inflammation and endothelial dysfunction[7,25,26]. Our metabolic studies confirmed lower insulin sensitivity and less insulin secretion in the GDM group compared with control that did not have metabolic syndrome. Participants with GDM and metabolic syndrome after delivery had the least insulin sensitivity, reconfirming a pathogenic spectrum that finally leads to type 2 diabetes mellitus.

The metabolic syndrome increases the future risk of cardiovascular diseases especially in patients with concomitant DM[26]. In the GDM group, we observed an increased life time cardiovascular risk compared to the control group, so they are a priority group for continued counseling and follow-up to reduce their risk. Increased inflammatory markers and endothelial dysfunction are responsible for the pathogenesis and long-term outcome[7,215,26]. According to the nature of the cross-sectional data, this result did not reflect the incidence of the metabolic syndrome. Also we could not exclude the possibility of the metabolic syndrome existing before the index pregnancy.

Conclusion

This study showed that Thai women with a previous history of GDM were more likely to have metabolic syndrome after delivery compared with normal participants. Obesity was a strong independent risk factor for this condition. Given the increased lifetime risk for cardiovascular events in GDM, aggressive monitoring and lifestyle modification to prevent diabetes and cardiovascular complications is warranted in this population.

What is already known on this topic?

GDM is a risk factor of type 2 DM. After delivery, women with GDM have more incidence of metabolic syndrome than normal subjects.

What this study adds?

The prevalence of metabolic syndrome after delivery in the GDM and control group was 26.8% and 7.8%, respectively in Thai. Univariate analysis showed that previously diagnosed GDM possessed higher prevalence for metabolic syndrome after delivery (OR 4.3, 95% CI 1.32-13.99). This study showed that Thai women with a previous history of GDM were more likely to have metabolic syndrome after delivery compared with normal subjects. Obesity was a strong independent risk factor for this condition.

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R.R. researched data and wrote the manuscript. T.T. reviewed and edited the manuscript. P.S. contributed to discussion and edited the manuscript.

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Potential conflicts of interest

None.

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ความชุกและปัจจัยเสี่ยงของเมตะบอลิกซินโดรมในหญิงที่เคยได้รับการวินิจฉัยโรคเบาหวานขณะตั้งครรภ์เปรียบกับหญิงตั้งครรภ์ปกติ

รุ่งกาญต์ รักษาสกุล, ทิพาพร ธาระวานิช, ภาสกร ศรีทิพย์สุโข

ภูมิหลัง: *ที่ผ่านมายังไม่มีการศึกษาเกี่ยวกับภาวะเมตะบอลิกซินโดรมหลังคลอดในหญิงไทยที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์*

วัตถุประสงค์: *เพื่อเปรียบเทียบความชุกและปัจจัยเสี่ยงของเมตะบอลิกซินโดรมหลังคลอดในหญิงไทยที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์ เปรียบเทียบกับหญิงที่เคยตั้งครรภ์ปกติ*

วัสดุและวิธีการ: *การศึกษาแบบจับคู่ในหญิงที่เคยได้รับการวินิจฉัยโรคเบาหวานขณะตั้งครรภ์ (n = 56) และหญิงตั้งครรภ์ปกติ (n = 51) ที่คลอดในช่วงปี พ.ศ. 2550-2556 ที่โรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติได้รับการประเมินความผิดปกติทางเมตะบอลิกและทดสอบความทนต่อน้ำตาลกลูโคส 75 กรัม ในปี พ.ศ. 2556-2557 ปัจจัยเสี่ยงของเมตะบอลิกซินโดรมวิเคราะห์โดยการถดถอยโลจิสติก*

ผลการศึกษา: *หญิงที่เคยคลอดบุตรเข้าร่วมการวิจัยในระยะเวลาเฉลี่ย 2.97±1.15 ปี หลังคลอด เมื่อเปรียบเทียบระหว่างหญิงที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์และหญิงที่เคยตั้งครรภ์ปกติ พบว่าหญิงที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์มีอายุเฉลี่ยขณะปัจจุบัน ดัชนีมวลกายก่อนการตั้งครรภ์ อัตราส่วนเส้นรอบเอวต่อความสูง และความดันซิสโตลิกสูงกว่าหญิงที่เคยตั้งครรภ์ปกติ เมตะบอลิกซินโดรมหลังคลอดพบในหญิงที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์มากกว่าอีกกลุ่มอย่างมีนัยสำคัญทางสถิติ (26.8% (15/56) เปรียบเทียบกับ 7.8% (4/51), OR4.3, 95% CI: 1.32-13.99) ปัจจัยที่สัมพันธ์กับเมตะบอลิกซินโดรมคือ การมีดัชนีมวลกายก่อนตั้งครรภ์ตั้งแต่ 25 กก./ม^2 ขึ้นไป (OR 7.18, 95% CI 1.79-28.80; p = 0.005) หลังคลอดหญิงที่เคยเป็นโรคเบาหวานขณะตั้งครรภ์พบว่า มีภาวะดื้อต่ออินซูลินสูง (ประเมินโดย HOMA-IR) ความไวต่ออินซูลินต่ำ (ประเมินโดย Masuda index และ QUICKI) และการหลั่งอินซูลินลดลง (ประเมินโดย HOMA-B) เมื่อเปรียบเทียบกับกลุ่มหญิงที่เคยตั้งครรภ์ปกติที่ไม่มีเมตะบอลิกซินโดรม*

สรุป: *หญิงที่เคยได้รับการวินิจฉัยโรคเบาหวานขณะตั้งครรภ์มีความชุกของเมตะบอลิกซินโดรมหลังคลอดมากกว่าหญิงที่เคยตั้งครรภ์ปกติ ความอ้วนตั้งแต่ก่อนการตั้งครรภ์เป็นปัจจัยเสี่ยงของเมตะบอลิกซินโดรมหลังคลอด*