Non-Compliance to Clinical Practice Guideline for Screening of Gestational Diabetes Mellitus in Siriraj Hospital

Irene Ruengkhachorn MD*,
Prasert Sunsaneevithayakul MD*, Dittakarn Boriboonhirunsarn MD, MP H, PhD**

** Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University*

Objective: *To evaluate the rate of non-compliance to Clinical Practice Guideline (CPG) for screening of Gestational Diabetes Mellitus (GDM) and related factors in Siriraj Hospital.*
Study design: *Descriptive cross-sectional study.*
Setting: *Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University.*
Material and Method: *One-hundred-and-fifty-nine pregnant women at risk for GDM and who delivered at Siriraj Hospital were enrolled. Data were collected from history and medical records including base line characteristics, clinical risk factors of GDM, and compliance to guideline. Rate of non-compliance and related factors were evaluated.*
Results: *The rate of non-compliance to GPG for screening of GDM at Siriraj Hospital was 22% (95%CI 16.3%-29.1%). The rate was highest among women who had AnteNatal Care (ANC) at a private clinic (82.1%), followed by the private cases in the hospital (40%).Those who received ANC at the hospital had the lowest non-compliance rate of 6.6%.The most common neglected risk factor was maternal age $\geq$ 30 years. Significant higher compliance was found among women with 2 or more clinical risk factors compared to those with only 1 risk factor (p = 0.028).*
Conclusion: *The rate of non-compliance to CPG for screening of GDM at Siriraj Hospital was 22%. Highest non-compliance rate was found among the private cases. The most common neglected risk factor was maternal age $\geq$ 30 years.*

Keywords: *Clinical practice guideline, Gestational diabetes mellitus, Screening program, Non-compliance*

J Med Assoc Thai 2006; 89 (6): 767-72
Full text. e-Journal: *http://www.medassocthai.org/journal*

Gestational Diabetes Mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset of hyperglycemia during pregnancy[1-5]. Insulin resistance normally develops during pregnancy, late pregnancy is characterized by higher fasting plasma insulin, higher insulin requirement in response to meals[6]. GDM affects as many as 6.2% of pregnant women with clinical risk factors[7]. Several studies suggested that hyperglycemia was associated with adverse maternal and fetal outcomes[8-12]. Early GDM screening is important to diagnose and treat to avoid diabetes related complications[13-16]. Previous studies suggested a significant higher rate of GDM in the universally screening group[17-20], but recent studies have focused on the advantage of selective screening[7,21-23].

A clinical practice guideline for the screening and diagnosis of GDM has been implemented at Siriraj Hospital since 2001. All pregnant women were screened for clinical risk factors during their first antenatal visit. Clinical risk factors included family history of DM, maternal age $\geq$ 30 years, previous history of fetal macrosomia, previous history of fetal anomalies, previous history of unexplained intrauterine fetal death, previous history of PIH, previous history of GDM, and obesity (BMI $\geq$ 27)[7].

At the first antenatal visit, the high-risk pregnant women for GDM would be given 50-gram Glucose

Correspondence to : Ruengkhachorn I, Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

Challenge Test (GCT) as a screening test and confirmed by 100-gram Oral Glucose Tolerance Test (OGTT) if indicated. If initial screening was normal, repeated screening tests were applied again during 28-32 weeks of gestation. Criteria for the diagnosis of GDM were based on OGTT cutoff points established by the National Diabetes Data Group (NDDG)[1,24]. Diagnosis of GDM was made when any two of four plasma glucose levels met or exceeded the value of 105, 190, 165, and 145 mg/dl at baseline, 1st, 2nd and 3rd hour respectively.

The present study was conducted to evaluate the compliance with the clinical practice guideline among pregnant women who delivered at Siriraj Hospital. Possible factors associated with the non-compliance were also evaluated. The results would be valuable in improving care of these high-risk women.

Material and Method

This descriptive cross-sectional study consisted of 159 pregnant women who delivered at the Department of Obstetrics and Gynecology, Siriraj Hospital, Mahidol University, in 2004. The inclusion criteria were pregnant women who had at least one clinical risk factor for GDM and received regular antenatal care. The exclusion criteria were overt DM, gestational age at first ANC over 24 weeks of gestation, and received antenatal care by physicians who do not work at Siriraj Hospital.

Baseline data regarding the clinical risk factors, number of screening and diagnostic tests and their results were collected from history and record forms of antenatal care. Non-compliance was defined as not to receive screening and diagnostic tests as described earlier, including incomplete testing and failure to perform both tests. Partial compliance was defined as to perform only one test. Places where AnteNatal Care (ANC) was provided were classified into at Siriraj Hospital and at private clinic. Data on being a private case or not were also collected.

Descriptive statistics were used to describe various baseline characteristics, using mean, standard deviation, number, and percentage. Prevalence of non-compliance to the CPG was estimated. Comparisons of various characteristics were made between compliant and non-compliant groups to determine possible associated factors, including ANC status and clinical risks. Chi square test was used to analyse the data. Statistical significance was considered if p value < 0.05.

The present study has been reviewed and approved by Ethics Committee, Faculty of Medicine Siriraj Hospital, Mahidol University.

Results

One-hundred-and-fifty-nine pregnant women with at least one clinical risk factor for GDM were enrolled. Table.1 shows baseline characteristics of these women. Mean maternal age was 32.0 ± 5.9 years and mean gestational age at first antenatal visit was 12.4 ± 5.7 weeks of gestation. The majority of the women (76.1%) was non-private cases and had their ANC at Siriraj Hospital. In the private cases, 17.6% had their ANC at a private clinic and 6.3% had their ANC at Siriraj Hospital.

Table 2 shows clinical risk profile of the 159 cases. The most common clinical risk was maternal age ≥ 30 years that was found on 76.1% of the cases. Family history of DM was reported in 37.7%, obesity was at 10.1% while previous history of GDM during previous pregnancy was found in 2.4% of these cases. No women had a previous history of congenital fetal anomaly or hypertension. Most of the women had only one clinical risk (77.4%).

Non-compliance to CPG was found in 35 women giving the overall prevalence of 22.0% (95%CI 16.3%-29.1%), partial compliance (received only one test) was 8.2% and full compliance was 69.8%. Thirteen pregnant women were diagnosed with GDM. All of them were in class A1 and were in the compliance group (11.7%).

When antenatal care status was compared between different compliance groups, significant higher rates of non-compliance and partial compliance were observed among private cases, especially those who received ANC at a private clinic ($p < 0.001$). The results are shown in Table 3.

Table 4 shows the relationship between non-compliance to CPG and clinical risk factors. No significant difference was observed between various risks for GDM. However, among common risks, non-compliance rate was highest among women who were

Table 1. Baseline characteristics (n = 159)

Characteristic	Number (%)
Mean age $\pm$ SD (years)	32.0 ± 5.9
Mean GA at first ANC $\pm$ SD (weeks)	12.4 ± 5.7
ANC status	
- Siriraj Hospital/Non-private	121 (76.1)
- Siriraj Hospital/Private	10 (6.3)
- Clinic/Private	28 (17.6)
Parity	
- Nulliparous	77 (48.4)
- Multiparous	82 (51.6)

Table 2. Clinical risk factors for GDM (n = 159)

Clinical risk factors	Number (%)
Maternal age ≥ 30 years	121 (76.1)
Family history of DM	60 (37.7)
Previous history of fetal macrosomia	1 (1.2)
Previous history of congenital fetal anomaly	-
Previous history of unexplained intrauterine fetal death	1 (1.2)
Previous hypertension	-
Previous history of GDM during previous pregnancy	2 (2.4)
Obesity	16 (10.1)
Number of clinical risk factors	
- 1	123 (77.4)
- ≥2	36 (22.6)

Table 3. Relationship between non-compliance to CPG and antenatal care status

Antenatal care status	Compliance to CPG			p-value*
	Non-compliance N (%)	Partial compliance N (%)	Fullcompliance N (%)	
Siriraj Hospital/Non-private	8 (6.6)	7 (5.8)	106 (87.6)	<0.001
Siriraj Hospital/Private	4 (40.0)	1 (10.0)	5 (50.0)	
Clinic/Private	23 (82.1)	5 (17.9)	0	

* by Chi-square test

Table 4. Relationship between non-compliance to CPG and clinical risk factors

Risk factors for GDM	Compliance to CPG			p-value*
	Non-compliance N (%)	Partial compliance N (%)	Fullcompliance N (%)	
Clinical risk factors				0.224
- Family history of DM	5 (8.3)	5 (8.3)	50 (83.3)	
- Maternal age ≤ 30 years	29 (24.0)	12 (9.9)	80 (66.1)	
- Obesity	2 (12.5)	1 (6.2)	13 (81.3)	
- Previous history of macrosomia/unexplained fetal death/GDM	1 (25.0)	0	3 (75.0)	
Number of clinical risk factors (n = 159)				0.028
- 1	33 (26.8)	9 (7.3)	81 (65.9)	
- ≥2	2 (5.6)	4 (11.1)	30 (83.3)	

* by Chi-square test

≥ 30 years of age (24.0%). Among uncommon risks, one non-compliance was observed in a pregnant woman who had a previous history of unexplained fetal death, which were missed from initial risk screening. In addition, significant higher non-compliance rate was observed among those who had only 1 risk compared to those who had ≥ 2 risks (p = 0.028).

Discussion

GDM is a diabetogenic state manifested by insulin resistance and hyperinsulinemia which could make fasting hypoglycemia and postprandial hyper-

glycemia in pregnancy[1,2,6]. GDM occurs when a woman's pancreatic function is not sufficient to overcome the insulin resistance created by anti-insulin hormones and the increased energy consumption necessary to provide for the growing mother and fetus[6]. The diagnosis of GDM is important because some complications may be associated with this condition such as polyhydramnios, fetal macrosomia, and pre-eclampsia[8-12].

Since early detection and treatment of GDM could avoid maternal and neonatal complications, a clinical practice guideline has been developed and implemented in Siriraj Hospital. A risk-based selective screening was used, corresponding to the guidelines from the American Diabetes Association (ADA) and American College of Obstetricians and Gynecologists (ACOG)[1,24-27]. However, about 10% of women with GDM could have been missed from such selective screening scheme[17,19]. Therefore, compliance to the guidelines is important and the omission to follow the CPG would have missed more cases of GDM. In the present study GDM was diagnosed in 13 of 111 women who complied with the CPG (11.7%). If a similar rate was applied to those in the partial and non-compliance group, approximately 5 to 6 cases of GDM would be missed.

In the present study, non-compliance rate to CPG in Siriraj Hospital was 22%. The rate of non-compliance was highest among women who received ANC in a private clinic (82.1%). This might be due to the concern of inconvenience and costs of the tests, or negligence of the physicians themselves. Surprisingly, even the private cases who received ANC at the hospital had a non-compliance rate of 40%. This group was from the special clinic (after official hours) where the guideline is not readily implemented and management is by individual judgment. When each clinical risk was considered separately, the poorest compliance was found in women $\geq$ 30 years of age. Although a previous report has shown that maternal age $\geq$ 30 years was one of the significant risks of the authors' guidelines, some physicians still overlook its importance[7]. The number of clinical risks also played an important role that compliance rate was found to be significantly higher among those who had 2 or more clinical risks compared to those with only 1 risk ($p = 0.028$). It is possible that a higher number of clinical risks raise more concern to the physicians and the compliance rate was also increased.

Various measures have been implemented to improve the compliance to the CPG. A checklist with a table of cutoff BMI values has been developed to screen all pregnant women for their clinical risk with ease. A table of screening test timing and results was incorporated into the antenatal care record form that partly helps in reminding the physician for the subsequent tests. However, the results from the present study showed that there was still overall 22% of non-compliance, even in non-private cases (6.6%). Therefore, more intensive strategy should be established to improve such a compliance rate. Policy should be launched to motivate and emphasize the importance of screening and diagnosis of GDM, especially among staff members to further improve the compliance among private cases.

References

1. Cunnigham FG, Leveno KJ, Bloom SL, Hauth JC, Glistrap LC III, Wenstrom KD, editors. Williams obstetrics. 22nd ed. New York: McGraw-Hill; 2004: 1169-87.
2. Bliecher SJ, O'Sullivan JB, Freinkl N. Carbohydrate metabolism in pregnancy. N Engl J Med 1964; 271: 866-9.
3. National Diabetes Data Group. Classification and diagnosis of diabetes mellitus and other categories of glucose intolerance. Diabetes 1979; 28: 1039-57.
4. Metzger BE, the Organizing Comittee: summary and recommendations of the Third International Workshop-Conference on Gestational Diabetes Mellitus. Diabetes 1991; 40: 197-201.
5. Metzger BE, Coustan DR. Summary and recommendations of the Fourth International Workshop-Conference on Gestational Diabetes Mellitus. The Organizing Committee. Diabetes Care 1998; 21: B161-7.
6. O'Brien K, Carpente M. Testing for gestational diabetes. Clin Lab Med 2003; 23: 443-56.
7. Sunsaneevithyakul P, Boriboonhirunsarn D, Sutanthavibul A, Ruangvuthilert P, Knokpongsakdi S, Singkiratana D, et al. Risk factor-based selective screening program for gestational diabetes mellitus in Siriraj Hospital: result from clinical practice guidline. J Med Assoc Thai 2003; 86: 708-14.
8. Hawthorne G, Snodgrass A, Tunbridge M. Outcome of diabetic pregnancy and glucose intolerance in pregnancy: an audit of fetal loss in Newcastle General Hospital 1977-1990. Diabetes Res Clin Pract 1994; 25: 183-90.
9. Adams KM, Li H, Nelson RL, Ogburn PL Jr, Danilenko-Dixon DR. Sequelae of unrecognized gestational diabetes. Am J Obstet Gynecol 1998;

178: 1321-32.
10. Cundy T, Gamble G, Townend K, Henley G, Macpherson P, Roberts AB. Perinatal mortality in type 2 diabetes mellitus. Diabet Med 2000; 17: 33-9.
11. Yogev Y, Xenakis EM, Langer O. The association between preeclampsia and the severity of gestational dibetes: the impact of glycemic control. Am J Obstet Gynecol 2004; 191: 1655-60.
12. American Diabetes Association. Gestational diabetes mellitus. Diabetes Care 2004; 27: S88-90.
13. Nahum GG, Wilson SB, Stanislaw H. Early pregnancy glucose screening for gestational diabetes mellitus. J Reprod Med 2002; 47: 656-62.
14. Bartha JL, Matinez- Del-Fresno P, Comino- Delgado R. Early diagnosis of gestational diabetes mellitus and prevention of diabetes-related complications. Eur J Obstet Gynecol Reprod Biol 2003; 109: 41-4.
15. Maegawa Y, Sugivama T, Kusaka H, Mitao M, Toyoda N. Screening tests for gestational diabetes in Japan in the 1st and 2nd trimester of pregnancy. Diabetes Res Clin Pract 2003; 62: 47-53.
16. Boriboonhirunsarn D, Sunsaneevithayakul P, Nuchangrid N. Incidence of gestational diabetes mellitus diagnosed before 20 weeks of gestation. J Med Assoc Thai 2004; 87: 1017-21.
17. Moses RG, Moser J, Davis WS. Gestational diabetes: do learn young caucasian women need to be tested? Diabetic Care 1998; 21: 1803-6.
18. Griffen ME, Coffee M, Johnson H, Scanlon P, Foley M, Stronge J, et al. Universal vs. risk factor-based screening for gestational diabetes mellitus: detection rates, gestation at diagnosis and outcome. Diabet Med 2000; 17: 26-32.
19. Baliutaviciene D, Petrenko V, Zalinkevicius R. Selective or universal diagnostic testing for gestational diabetes mellitus. Int J Gynecol Obstet 2002; 78: 207-11.
20. Poyhonen-Alho MK, Teramo KA, Kaaja RJ, Hiilesmaa VK. 50 gram oral glucose challenge test combined with risk factor-based screening for gestational diabetes. Eur J Obstet Gynecol Reprod Biol 2005; 121: 34-7.
21. Naylor CD, Sermer M, Chen E, Farine D. Selective screening for gestational diabetes mellitus. N Engl J Med 1997; 337: 1591-6.
22. Jimenez-Moleon JJ, Bueno-Cavanillas A, Luna-del-Castillo JD, Garcia-Martin M, Lardelli-Claret P, Galvez-Vargas R. Prevalence of gestational diabetes mellitus: variations related to screening strategy used. Eur J Endoclinol 2002; 146: 831-7.
23. Chanprapaph P, Sutjarit C. Prevalence of gestational diabetes mellitus in woman screened by glucose chanllenge test at Maharaj Nakorn Chiang Mai Hospital. J Med Assoc Thai 2004; 87: 1141-6.
24. Brody SC, Harris R, Lohr K. Screening for gestational diabetes: a summary of the evidence for the U.S. Preventive Services Task Force. Obstet Gynecol 2003; 101: 393-5.
25. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Diabetes care 2000; 23: S4-19.
26. American College of Obstetricians and Gynecologists Committee on Practice Bulletins.Clinical management guidelines for obstetrician-gynecologists. Number 30,September 2001. Obstet Gynecol 2001; 98: 525-38.
27. American Diabetes Association. Gestational diabetes mellitus. Diabetes Care 2002; 25: S94-6.

อัตราการไม่ปฏิบัติตามแนวทางการตรวจคัดกรองภาวะเบาหวานขณะตั้งครรภ์ในโรงพยาบาลศิริราช

ไอรีน เรืองขจร, ประเสริฐ ศันสนียวิทยกุล, ดิฐกานต์ บริบูรณ์หิรัญสาร

วัตถุประสงค์: *เพื่อศึกษาอัตราการไม่ปฏิบัติตามแนวทางการตรวจคัดกรองภาวะเบาหวานขณะตั้งครรภ์ และปัจจัยที่มีความสัมพันธ์กับการไม่ปฏิบัติตามดังกล่าว ในโรงพยาบาลศิริราช*

ชนิดของการวิจัย: *การศึกษาแบบตัดขวางเชิงพรรณนา*

วัสดุและวิธีการ: *กลุ่มศึกษาคือสตรีตั้งครรภ์จำนวน 159 ราย ที่มาคลอดในห้องคลอด โรงพยาบาลศิริราช โดยสตรีตั้งครรภ์เหล่านั้นจะได้รับการซักประวัติและทบทวนเวชระเบียนเพื่อทำการรวบรวมข้อมูลต่าง ๆ ได้แก่ ข้อมูลทั่วไป ปัจจัยเสี่ยงต่อการเกิดภาวะเบาหวานขณะตั้งครรภ์ ข้อมูลเกี่ยวกับผลการตรวจคัดกรองและการวินิจฉัยภาวะเบาหวานขณะตั้งครรภ์ ข้อมูลเกี่ยวกับปัจจัยที่อาจมีผลต่อการไม่ปฏิบัติตามแนวทางการตรวจคัดกรอง เช่น สถานที่ฝากครรภ์ การมีอาจารย์เป็นเจ้าของไข้ เป็นต้น และนำข้อมูลที่ได้ไปวิเคราะห์เพื่อค้นหาอัตราการไม่ปฏิบัติตามแนวทางการตรวจคัดกรองภาวะเบาหวานขณะตั้งครรภ์ และปัจจัยที่มีความสัมพันธ์กับการไม่ปฏิบัติตามดังกล่าว*

ผลการศึกษา: *อัตราการไม่ปฏิบัติตามแนวทางการตรวจคัดกรองภาวะเบาหวานขณะตั้งครรภ์ ในโรงพยาบาลศิริราช เท่ากับ 22% ผลการวิเคราะห์พบว่า อัตราการไม่ปฏิบัติดังกล่าวพบสูงที่สุดในกลุ่มที่ฝากครรภ์ที่คลินิก (82.1%) รองลงมาคือกลุ่มที่อยู่ในความดูแลของอาจารย์แพทย์และฝากครรภ์ที่โรงพยาบาล (40%) และน้อยที่สุดในกลุ่มที่เป็นผู้ป่วยทั่วไปและฝากครรภ์ที่โรงพยาบาล (6.6%) โดยปัจจัยเสี่ยงที่ถูกละเลยมากที่สุดคือการที่มารดามีอายุตั้งแต่ 30 ปี*

สรุป: *อัตราการไม่ปฏิบัติตามแนวทางการตรวจคัดกรองภาวะเบาหวานขณะตั้งครรภ์ ในโรงพยาบาลศิริราช เท่ากับ 22 % โดยพบอัตราดังกล่าวสูงที่สุดในกลุ่มผู้ป่วยที่อยู่ในความดูแลของอาจารย์แพทย์ ปัจจัยที่มีความสัมพันธ์กับการไม่ปฏิบัติตามดังกล่าวมากที่สุด คือการที่มารดามีอายุตั้งแต่ 30 ปี*