

Result of Ambulatory Diet Therapy in Gestational Diabetes Mellitus

Prasert Sunsaneevithayakul MD*,
Sujin Kanokpongsakdi MD*, Anuwat Sutanthavibul MD*,
Pornpimol Ruangvutilert MD, PhD*, Dittakarn Boriboohirunsarn MD, MPH, PhD*,
Teanta Keawprasit BNS**, Ruanthip Tantawattana BNS**

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

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

Objectives: To evaluate the effectiveness of an ambulatory program for glycemic control of women with gestational diabetes mellitus (GDM).

Material and Method: A total of 33 women with GDM whose FBS from OGTT ≥ 105 mg/dl were scheduled to attend weekly ambulatory care for dietary therapy with their family. FBS and 2-hour postprandial blood glucose were monitored every visit for a few weeks. At the end of this program, those with poor glycemic control were admitted for further tight dietary control by conventional 3-day course after which insulin was finally started for the women whose glycemic control remained poor.

Results: After the ambulatory program, 14 of 33 cases (42.4%) achieved good glycemic control without hospitalization. Another 6 cases (18.2%) did not need insulin therapy after admission for 3-day intensive dietary therapy. Altogether, 20 out of 33 cases (60.6%) of GDM whose FBS from OGTT ≥ 105 mg/dl could avoid insulin therapy after attending the ambulatory program alone or with additional 3-day intensive dietary therapy course. Similar effectiveness was observed from the authors' previous study on 3-day intensive dietary therapy alone.

Conclusion: The authors' current ambulatory dietary therapy program has shown to be effective in achieving good glycemic control and avoiding unnecessary insulin therapy and admission in most cases of women with GDM. In the future, an even more effective ambulatory diet control may ascertain that once a woman is hospitalized, insulin should be started right away.

Keywords: Ambulatory program, Dietary therapy, Gestational diabetes mellitus

J Med Assoc Thai 2006; 89 (1): 8-12

Full text. e-Journal: <http://www.medassocthai.org/journal>

Gestational diabetes (GDM) is a heterogeneous group of disorders in which diabetes or glucose intolerance is first diagnosed during pregnancy⁽¹⁾. Glucose intolerance in GDM is caused by reduced insulin sensitivity and impaired ability to increase insulin secretion in response to glucose. The definition of GDM applies whether insulin or only diet modification is used for treatment and whether the condition persists after pregnancy.

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

GDM increases risks for both the mother and the baby and must be treated promptly. Satisfactory pregnancy outcomes of GDM are associated with good glycemic control prior to conception and throughout pregnancy. Although obstetricians have little opportunity to control blood glucose level before pregnancy, good glycemic control can be achieved throughout pregnancy using dietary and/or insulin therapy.

Most women with GDM are in class A1 and can be treated with diet management alone. Cases with fasting blood sugar (FBS) of ≥ 105 mg/dl are placed into class A2 and insulin is recommended according to

American College of Obstetricians and Gynecologists in 1986. Insulin therapy means hospitalization for dose adjustment and patient training for injection. However, the authors' previous study has shown that with appropriate diet control in such cases, insulin is needed in approximately 40%⁽²⁾. In that study, the authors used intensive dietary therapy in a three-day period in the hospital to control maternal blood glucose in GDM with FBS from 100-g oral glucose tolerance test (OGTT) ≥ 105 mg/dl. Although a third of this group had the benefit of avoiding insulin therapy after this protocol, the authors still had to hospitalize these women. To reduce the admission rate, an initial trial of dietary therapy at home or as an ambulatory basis should be considered to avoid over treatment of insulin therapy and admission. There are conflicting guidelines surrounding dietary management and this has resulted in a lack of conformity to the dietary advice currently prescribed. Dietary therapy for pregnant women with diabetes should be individualized, with consideration given to usual eating habits and other lifestyle factors⁽³⁾. Nutrition recommendations are then developed to meet treatment goals and desired outcomes. The authors introduced the Siriraj program of a few weeks' ambulatory dietary therapy in GDM with FBS from OGTT ≥ 105 mg/dl. The authors also hypothesized that this kind of ambulatory program could change life style on diet of these women and control their blood glucose level, at least with the same result as our previous protocol, leading to reduction of admission rate for these patients.

Material and Method

The present prospective study included women with GDM diagnosed at Siriraj Hospital from August 1, 2003 to August 31, 2004. During that period, all pregnant women who had one clinical risk factor or more for diabetes were screened with 50-g 1-hour glucose challenge test (GCT) at first visit, 24-28 weeks, and 32-34 weeks gestation^(2,4). If plasma glucose from 50-g GCT was ≥ 140 mg/dl, OGTT was done a week later. Diagnosis of GDM was made using the National Diabetes Data Group Criteria that two or more elevated values were considered abnormal.

GDM women with FBS from OGTT < 105 mg/dl were scheduled to attend a high-risk pregnancy clinic. Ambulatory program for dietary therapy was offered to those whose FBS from OGTT ≥ 105 mg/dl. They were instructed for diet therapy every week for a few weeks by well-trained diabetes nurse educators and physicians. This primary care management involved

guiding each patient to be aware of their problems and providing knowledge of the pathophysiology of diabetes in a one-on-one fashion. Counseling about diabetes in detail and general antenatal management such as fetal well-being testing were given during each visit. FBS and 2-hour postprandial blood glucose were monitored every visit. Poor glycemic control criterion of FBS ≥ 105 mg/dl or 2-hour postprandial blood glucose of ≥ 120 mg/dl at the end of ambulatory program was used for hospitalization. If hospitalized, the 3-day intensive dietary therapy was initiated as previously reported⁽²⁾. In addition, those with poor glycemic control after the intensive diet therapy in the hospital were prescribed insulin on the fourth day of admission⁽²⁾. On the other hand, those with good glycemic control after attending ambulatory program or after 3-day intensive dietary therapy were scheduled to attend high risk pregnancy clinic in the next couple of weeks for further monitoring and continuing antenatal care.

All data including gestational age at diagnosis, the results of OGTT, FBS and 2-hour postprandial blood glucose values, and the requirement of admission including insulin therapy were collected prospectively.

Results

Between August 1, 2003 to August 31, 2004, a total of 4,040 cases with at least one clinical risk were screened for GDM according to the authors' guidelines⁽⁵⁾. GDM was diagnosed in 317 cases, 17.0% of these (54 cases) had level of FBS ≥ 105 mg/dl on their OGTT. Only 33 cases of these 54 cases (61.1%) attended the ambulatory program of dietary therapy with their family. FBS and 2-hour postprandial blood glucose levels were monitored every visit.

After the program, patients were stratified into 2 groups according to their blood glucose profiles as shown in Table 1. Of the 33 cases, 14 women (42.4%) had FBS < 105 mg/dl and 2-hour postprandial blood glucose < 120 mg/dl, thus could be discharged from ambulatory program without hospitalization and were scheduled to attend the high-risk pregnancy clinic two weeks later. These women were classified as GDM class A1.

The other 19 women (57.6%) still had FBS ≥ 105 mg/dl and required hospitalization for further tight conventional dietary therapy. After the 3-day intensive dietary program during admission, 13 of 19 cases (68.4%) were prescribed insulin on the fourth day of admission as their FBS levels were still ≥ 105 mg/dl,

as shown in Table 2. Insulin therapy was not needed in the remaining cases (6 cases; 31.6%) due to good glycemic control, FBS being < 105 mg/dl and mean 2-hour postprandial blood glucose being < 120 mg/dl.

Altogether, 20 out of 33 cases (60.6%) of GDM with FBS from OGTT \geq 105 mg/dl could avoid insulin therapy after attending our programs of ambulatory or following with conventional 3-day intensive dietary therapy and were classified as GDMA1. The rest, (39.4%) were prescribed insulin therapy in addition to dietary therapy (GDM A2) as shown in Table 3.

Discussion

Patients with well-controlled gestational diabetes by diet therapy only are at low risk for an intrauterine fetal death. Not only the establishment of maternal euglycemia has dramatically improved fetal outcome, the benefits of strict metabolic control also go far beyond pregnancy. Pregnancy provides the ideal opportunity for education and counseling aiming at motivating the patient to improve long term diabetic

Table 1. Blood glucose profile after attending the ambulatory program of dietary therapy (n = 33 cases)

Group	n (%)
FBS \geq 105 mg/dl	19 (57.6%)
FBS < 105 mg/dl and 2 hour postprandial < 120 mg/dl	14 (42.4%)

Table 2. Blood glucose profile after 3 days of intensive dietary therapy during admission (n = 19 cases)

Group	n (%)
FBS \geq 105 mg/dl	13 (68.4%)
FBS < 105 mg/dl and mean 2 hour postprandial < 120 mg/dl	6 (31.6%)

Table 3. Classification of GDM after the attending ambulatory program alone or in combination with the conventional 3-day intensive program of dietary therapy (n = 33 cases)

GDM class	n (%)	Insulin therapy
A1	20 (60.6%)	No
A2	13 (39.4%)	Yes

control. As GDM and type 2 diabetes appear to be the same entity, with the former constituting an early sign of the latter⁽⁶⁾, a good control during pregnancy and afterwards will effectively delay the onset and slow down the progression of microvascular complications in patients with insulin dependent diabetes mellitus⁽⁷⁾. In pregnancy complicated by diabetes, dietary therapy is important in achieving and maintaining optimal glycemic control. Good glycemic control is one determinant of maternal and fetal complications in pregnancy complicated by GDM⁽⁸⁾. The goals of dietary therapy, while aiming at blood glucose control, are to provide adequate maternal and fetal nutrition, energy intake for appropriate weight gain, and mineral supplements. If the blood glucose values in spite of an adequate diet control exceed the desirable target values, insulin therapy must be initiated.

Previously, Siriraj Hospital, all GDM women who had FBS from OGTT \geq 105 mg/dl regardless of prior dietary therapy at home had been hospitalized for 3-day intensive diet therapy⁽²⁾. To reduce the admission rate, longer trial of dietary therapy at home using ambulatory program was introduced. A previous study has shown that at least a 2 weeks' period is needed for evaluation of effect of dietary therapy alone in obtaining good glycemic control in women with GDM⁽⁹⁾. Thus, at least 2 weeks of dietary therapy alone should be allowed before insulin is considered.

In the present study, the authors sought to determine whether ambulatory program for dietary therapy would enable good glycemic control in GDM. Poor glycemic control which required admission was defined as FBS \geq 105 mg/dl or 2-hour postprandial blood glucose \geq 120 mg/dl after ambulatory program. This ambulatory program for dietary therapy resulted in 42.4% reduction of admission in GDM women who had FBS from OGTT \geq 105 mg/dl. A few weeks span of attending ambulatory diet therapy was beneficial for GDM women and their family to adapt their lifestyle of diet during pregnancy and to gain the benefit of avoiding admission. Among those who required admission, the present study also showed that 68.4% needed insulin therapy in addition to dietary therapy after conventional 3 day intensive dietary program. Almost a third (31.6%) of this group could avoid insulin therapy due to good glycemic control at the end of the program and these patients were classified as GDM class A1.

From our previous study, the 3-day intensive dietary therapy could avoid insulin therapy in 57.4% of cases⁽²⁾. Surprisingly, similar proportion of the same

group of GDM women who attended our ambulatory program alone or with additional 3-day intensive dietary therapy was observed (60.6%). This showed that our ambulatory program was at least as effective as in-hospital 3-day dietary therapy. Admission could be avoided in 14 of 20 cases (70%) of GDM class A1. A few weeks delay during the ambulatory care was not harmful to GDM women who finally needed insulin therapy at the end of the program⁽⁹⁾.

The present study had some limitation due to the small number of enrolled subjects. This may be due to increased patients' awareness about diet control after 4 years of screening program⁽⁵⁾. The percentage of GDM with FBS of ≥ 105 mg/dl from OGTT has dropped from 25% in the first year of the program to 17%. Another reason that only 61.1% of targeted GDM women enrolled in the present study was the effect of National Health Service Policy. Some GDM women went back to their local primary hospital after the diagnosis of GDM due to financial reasons.

Consideration might be given to this subgroup of GDM to reduce the admission rate further by enhancing the effectiveness of the ambulatory program or giving more time to attend the program. Future research to refine the ambulatory program further to substitute the 3-day intensive diet control in the hospital might ascertain that once a GDM woman fails to achieve good glycemic control after attending the ambulatory program and needs hospitalization, the insulin therapy can be started immediately.

Conclusion

An ambulatory program of dietary therapy was beneficial for the management of GDM patients, especially in whom FBS from OGTT was ≥ 105 mg/dl. Admission could be avoided in 42.4% and insulin was not required in approximately 60% of cases after ambulatory program alone or in combination with the conventional 3-day intensive dietary therapy. This may be the effect of a few weeks period during ambulatory program that GDM women had more time to change their lifestyle on diet. However, the ambulatory management of diabetes during pregnancy

requires that the women play an active role in their own diabetic care. Achievement of good glycemic control requires a supportive, knowledgeable, and accessible health care team. In the future, an even more effective ambulatory diet control may ascertain that once a woman is hospitalized, insulin should be started right away.

References

1. American Diabetes Association. Clinical practice recommendations: gestational diabetes mellitus. *Diabetes Care* 2002; 25: S94-6.
2. Sunsaneevithayakul P, Ruangvutilert P, Sutanthavibul A, Kanokpongsakdi S, Boriboohirunsarn D, Raengpetch Y, et al. Effect of 3-day intensive dietary therapy during admission in women after diagnosis of gestational diabetes mellitus. *J Med Assoc Thai* 2004; 87: 1022-8.
3. Anonymous. Nutrition recommendations and principles for people with diabetes mellitus. *J Am Diet Assoc* 1994; 94: 504-6.
4. The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care* 2002; 25: S5-20.
5. Sunsaneevithayakul P, Boriboohirunsarn D, Sutanthavibul A, Ruangvutilert P, Kanokpongsakdi S, Singkiratana D, et al. Risk factor-based selective screening program for gestational diabetes mellitus in Siriraj Hospital: result from clinical practice guideline. *J Med Assoc Thai* 2003; 86: 708-14.
6. Vambergue A. What is the approach to gestational diabetes in 2001? *Diabet Met* 2001; 27: S53-60.
7. Homko CJ, Reece EA. Ambulatory care of the pregnant woman with diabetes. *Clin Obstet Gynecol* 1998; 41: 584-96.
8. Al-Najashi SS. Control of gestational diabetes. *Int J Gynecol Obstet* 1995; 49: 131-5.
9. Mc Farland MB, Langer O, Conway DL, Berkus MD. Dietary therapy for gestational diabetes: how long is long enough? *Obstet Gynecol* 1999; 93: 978-82.

ผลการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล ในสตรีที่ได้รับการวินิจฉัยภาวะเบาหวานขณะตั้งครรภ์

ประเสริฐ คັນสนีย์วิทยกุล, สุจินต์ กนกพงศ์ศักดิ์, อนุวัฒน์ สุตันทวิบูลย์, พรพิมล เรืองวุฒิเลิศ, ดิฐกานต์ บริบูรณ์หิรัญสาร, เตือนตา แก้วประสิทธิ์, รุ่งทิพย์ ตันทวารวณิช

วัตถุประสงค์: เพื่อประเมินผลการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล ต่อการควบคุมระดับควบคุมน้ำตาลในเลือด ในสตรีที่ได้รับการวินิจฉัยภาวะเบาหวานขณะตั้งครรภ์

วัสดุและวิธีการ: สตรีตั้งครรภ์ที่ได้รับการวินิจฉัยภาวะเบาหวานจากผลการตรวจเลือด OGTT ที่ FBS มีค่าตั้งแต่ 105 mg/dl ขึ้นไป จำนวน 33 ราย ได้รับการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล ร่วมกับครอบครัว โดยมีการตรวจระดับน้ำตาลในเลือด FBS และ 2-hour postprandial blood glucose ทุกสัปดาห์ที่มาใช้บริการเป็นเวลา 2-3 สัปดาห์ สตรีตั้งครรภ์ที่ยังคงตรวจพบระดับน้ำตาลในเลือดสูง เกินเกณฑ์ปกติจะได้รับการรักษาต่อโดยรับไว้ในโรงพยาบาลพร้อมให้การควบคุมอาหารอย่างเข้มงวดเป็นเวลานาน 3 วัน หลังจากนั้นจะให้การรักษาด้วยยาฉีด อินซูลิน เพิ่มเติมเฉพาะสตรีตั้งครรภ์ที่ยังไม่สามารถควบคุมระดับน้ำตาล ในเลือดให้อยู่ในเกณฑ์ปกติได้

ผลการศึกษา: ภายหลังจากการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล สตรีตั้งครรภ์ที่ได้รับการวินิจฉัยภาวะเบาหวานขณะตั้งครรภ์ จำนวน 14 ราย ใน 33 ราย (ร้อยละ 42.4) มีระดับน้ำตาลในเลือดอยู่ในเกณฑ์ปกติ ทำให้ไม่จำเป็นต้องเข้ารับการรักษาในโรงพยาบาล ขณะที่สตรีตั้งครรภ์ จำนวน 6 ราย (ร้อยละ 18.2) จำเป็นต้องรับไว้ในโรงพยาบาลเพื่อควบคุมอาหารอย่างเข้มงวดเป็นเวลานานสามวัน แต่ไม่จำเป็นต้องได้รับยาฉีดอินซูลิน สตรีตั้งครรภ์กลุ่มที่มี ระดับ FBS จากผลการตรวจเลือด OGTT ตั้งแต่ 105 mg/dl ขึ้นไป จำนวน 20 ราย ใน 33 ราย (ร้อยละ 60.6) สามารถหลีกเลี่ยงการใช้ยาฉีดอินซูลินภายหลังจากเข้ารับการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล แต่เพียงอย่างเดียว หรือรวมกับการรักษาด้วยการควบคุมอาหารอย่างเข้มงวดในโรงพยาบาลเป็นเวลานาน 3 วัน ผลการรักษาในรูปแบบทั้ง 2 วิธีได้ผลใกล้เคียงกัน

สรุป: ผลการรักษาด้วยการควบคุมอาหารในรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาล ที่ใช้ในการศึกษานี้มีประสิทธิภาพในการควบคุมระดับน้ำตาลในเลือด ลดการใช้ยาฉีดอินซูลิน และการรักษาในโรงพยาบาลที่ไม่จำเป็นลงได้ ในอนาคตควรมีการเพิ่มประสิทธิภาพในการควบคุมอาหารรูปแบบที่ไม่ต้องอยู่ในโรงพยาบาลดังกล่าวให้มากขึ้นจนถึงขั้นที่ว่าถ้าสตรีตั้งครรภ์จำเป็นต้องเข้ารับการรักษาในโรงพยาบาลสามารถเริ่มต้นฉีดยาอินซูลินได้ทันที