# Prevalence of gestational diabetes and pregnancy outcome in Pakistan

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## مدى انتشار السكري الحملي ونتيجة الحمل في كراتشي ، باكستان

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**خلاصة** : أجريت دراسة لتحديد مدى انتشار السكري الحملي ونتيجة الحمل لدى الحوامل المسجلة أسماؤهن في دار أغا خان للتوليد في كراتشي . ولقد أجرى الفحص الأولي بإعطائهن جرعة من الغلوكوز مقدارها 50 غرام . فإذا ما تجاوز مستوى غلوكوز الدم بعد ساعة واحدة 130 مغ% تم اللجوء إلى اختبار تحمل الغلوكوز الفموي لمدة ثلاث ساعات بإعطاء 100 غرام من الغلوكوز . واستند التشخيص إلى معايير أو سَليفان . وتم وصف الإنسولين عندما تجاوز غلوكوز الدم على الريق 95 مغ % وكان المعدل بعد ساعتين من تناول الطعام أكثر من 125 مغ% بعد أسبوع من العلاج الغذائي . ووجد أن معدل انتشار داء السكر الحملي 3,45% والوزن الإجمالي عند الميلاد 3,24 كغ ووفيات ما حول الولادة 2,08% . أما متوسط قيم الغلوكوز فكانت 93,46 مغ% في حالة الصيام و117,03 مغ% بعد ساعتين من تناول الطعام .

ABSTRACT Prevalence of gestational diabetes mellitus and the pregnancy outcome of women registered at the Aga Khan Maternity Home, Karachi was studied. Initial screening was by a glucose challenge test with 50 g glucose. If the 1-hour blood glucose level exceeded 130 mg%, then a 3-hour oral glucose tolerance test with 100 g glucose was performed. Diagnosis was based on O'Sullivan's criteria. Insulin was prescribed if the fasting blood glucose was more than 95 mg%, and the 2-hour post-prandial over 125 mg%, after a week of diet therapy. The prevalence of gestational diabetes was 3.45% with an aggregate birth weight of 3.24 kg, and perinatal loss of 2.08%. The mean blood glucose values were 93.46 mg% fasting and 117.03 mg%, 2 hours post-prandial.

**Prévalence du diabète gravidique et issue de la grossesse à Karachi (Pakistan)**
RESUME Il s'agit d'une étude de la prévalence du diabète gravidique et de l'issue de la grossesse chez des femmes inscrites dans le foyer maternel Aga Khan à Karachi. Le dépistage initial consistait à effectuer un test d'essai avec absorption de 50 g de glucose. Si la glycémie après une heure dépassait 130 mg%, on procédait alors à un test de tolérance glucidique trois heures après l'administration d'une charge orale en glucose de 100 g. Le diagnostic était basé sur les critères de O'Sullivan. L'insuline était prescrite si la glycémie à jeun était supérieure à 95 mg% et si le taux de glucose deux heures après un repas dépassait 125 mg%, après une semaine de thérapie alimentaire. La prévalence du diabète gravidique s'élevait à 3,45%, avec un poids à la naissance global de 3,24 kg et un taux de perte pendant la période périnatale de 2,08%. Les valeurs glycémiques moyennes se situaient autour de 93,46 mg% à jeun et de 117,03 mg% deux heures après un repas.

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## Introduction

Gestational diabetes mellitus (GDM) was first described as diabetes occurring "only during pregnancy, being absent other times", by Duncan in 1982 [*1*]. Further observations have associated GDM with macrosomia and stillbirth [2]. Both of these complications are preventable as they are related to the degree of maternal glycaemic control. The true prevalence of glucose intolerance during pregnancy in Pakistan is still to be determined. Small hospital-based studies have given figures of 3.2% for GDM and 1.9% for impaired glucose tolerance (IGT) [*3*]. This study was conducted to determine the prevalence of GDM and its effect on perinatal mortality and fetal size.

## Subjects and methods

The Aga Khan Maternity Home, Karimabad Unit, is one of the regional obstetric centres providing maternity care for women residing mainly in the northern areas of Karachi. It is staffed by consultants, residents and midwives, and provided with laboratory, anaesthetic and neonatal support. All pregnant women registered for antenatal care and delivery who were not known to be diabetics were included in the study, which ran from January 1990 to December 1992. Every registrant was subjected to a glucose challenge test with a 50 g glucose load [*4*]. Blood glucose exceeding 130 mg% 1 hour after the glucose ingestion was considered as positive and followed by a 3-hour oral glucose tolerance test with a 100 g glucose load. Women with a negative result were retested at 24 weeks gestation.

GDM was diagnosed on the basis of O'Sullivan's criteria [*5*]. Plasma glucose values of ≥ 105 mg%, ≥ 190 mg%, ≥165 mg%, ≥145 mg% for the fasting, 1-hour, 2-hour, and 3-hour samples, respectively, were considered abnormal. Two readings had to exceed or equal these values to give a diagnosis of GDM.

A detailed history was noted of every woman, followed by an extensive physical examination. The diet prescribed was free of refined sugar. It comprised 30–35 calories per kilogram ideal body weight per day divided into three main meals, two in-between snacks and one bedtime snack. The glycaemic level was closely monitored and if, after a week of dietary restrictions, optimal control (fasting blood glucose (FBG) ≤95 mg% and 2-hour post prandial ≤125 mg%) was not achieved, insulin therapy was started. Home blood-glucose monitoring, though highly desirable, could not be practised for economic reasons.

Each subject was seen every two weeks until the end of the pregnancy. Spontaneous labour was allowed unless contraindicated. After delivery, dietary restrictions and insulin were withdrawn and blood glucose monitored. The infants' birth weights were noted.

## Results

In the three consecutive years 1990–1992, the collective prevalence of GDM in the Aga Khan Maternity Home was found to be 3.45% (Table 1).

**Table 1 Prevalence rate of GDM**

| Deliveries | 1990 | 1991 | 1992 |
|---|---|---|---|
| Total | 1822 | 1770 | 1967 |
| GDM | 53 (2.90%) | 69 (3.90%) | 70 (3.56%) |

*Aggregate of prevalence rate GDM = 3.45%*

Table 2 **Age of GDM subjects**

| Age range (years) | 1990 | 1991 | 1992 |
|---|---|---|---|
| 20–25 | 10 | 18 | 18 |
| 25.1–30 | 29 | 30 | 36 |
| 30.1–35 | 9 | 12 | 12 |
| 35.1–40 | 5 | 8 | 4 |
| 40.1–45 | – | 1 | – |

*49.48% of subjects in 25.1–30 year age group*

Table 3 **Family history of diabetes mellitus**

| GDM | 1990 | 1991 | 1992 |
|---|---|---|---|
| Total number of cases | 53 | 69 | 70 |
| Number of subjects with family history | 27 | 27 | 36 |

*Aggregate 46.88% subjects with family history of diabetes mellitus*

Age ranges of the gestational diabetic women are presented in Table 2, where it can be seen that almost one-half lie in the range of 25.1–30 years of age.

A positive family history in first-degree relatives was present in nearly half the subjects (Table 3). The gravidity can be seen in Table 4. A total of 20 over the 3-year period gave a past history of GDM, amounting to 10.4%.

The targets for glycaemic levels aimed at were FBG ≤95 mg/dl and 2-hour postprandial blood glucose ≤125 mg/dl. The values for glycaemic control achieved are presented in Table 5.

Diet alone as therapy stabilized the glycaemic level in 84.2%, 61.5% and 75.6% of cases in the three years, respectively. A single morning dose of an intermediate-acting

Table 4 **Gravidity of GDM subjects**

| Gravidity | 1990 | 1991 | 1992 |
|---|---|---|---|
| Primigravida | 12 | 12 | 16 |
| 2nd | 11 | 14 | 15 |
| 3rd | 9 | 9 | 12 |
| 4th | 10 | 11 | 14 |
| 5th | 3 | 9 | 4 |
| 6th | 3 | 4 | 3 |
| 7th | 2 | 4 | 2 |
| 8th | 3 | 6 | 4 |

*Primigravidae: 20.8%*
*2nd gravidae: 20.9%*

Table 5. **Achieved glycaemic control in GDM cases**

| Year | Mean FBG (mg%) | Mean 2H PPBG (mg%) | Total cases |
|---|---|---|---|
| 1990 | 97.24 | 122.45 | 53 |
| 1991 | 87.93 | 113.98 | 69 |
| 1992 | 96.05 | 115.93 | 70 |

*FBG aggregate: 93.46 mg%*
*2H PPBG aggregate: 117.03 mg%*
*FBG = fasting blood glucose*
*2H PPBG = 2-hour post-prandial blood glucose*

Table 6 **Mode of delivery**

| Delivery | 1990 | 1991 | 1992 |
|---|---|---|---|
| SVD at term | 64.3 | 56.6 | 47.4 |
| Forceps assisted | 9.4 | 14.4 | 19.9 |
| ELSCS | 18.9 | 21.7 | 22.8 |
| Em. LSCS | 5.6 | 7.2 | 5.7 |
| Breech | 1.8 | – | 4.2 |

*SVD = spontaneous vaginal delivery*
*ELSCS = elective lower segment caesarean section*
*Em. LSCS = emergency lower segment caesarean section*

insulin provided an optimal glycaemic control in 10.5%, 27% and 14% of the women in 1990, 1991 and 1992, respectively. Twice-daily insulin was required for the desired results by 3.5%, 11.5% and 9% of the women, respectively. One woman in each of the two years 1990 and 1992 required a multiple dose regimen of insulin to provide a tight blood glucose control. The mode of delivery for the gestational diabetics is shown in Table 6.

There were only four losses in the three calendar years. There was one premature delivery at 24 weeks gestation followed by neonatal death, one abortion at 12 weeks, one intrauterine death at 32 weeks, the cause of which could not be determined, and one fresh stillbirth. This gives a figure of 2.08%.

The mean birth weights of the newborns were 3.30 kg, 3.24 kg and 3.17 kg in the three years, respectively.

## Discussion

Gestational diabetes has acquired its diagnostic importance as glucose intolerance with the recognition of onset during pregnancy. The offspring of mothers experiencing GDM are at a higher risk of intrauterine death or neonatal death, if they are not diagnosed and treated promptly. However, perinatal mortality for infants of women maintaining a good glycaemic control may not be higher than that in the general population. It is thus essential that all pregnant women should be screened for glucose intolerance as selective screening of high-risk cases proves inadequate. Systematic screening of gravid women is still not common in Pakistan. In addition to the lack of awareness among health professionals and to cost factors, an important reason for this is that a large percentage of women deliver at home with the help of traditional birth attendants. Some of the larger hospitals have instituted the tests as an essential part of their antenatal clinic services.

Every registrant, excluding established diabetics, is screened for glucose intolerance at the Aga Khan Maternity Home, Karimabad, Karachi. This study, running over three years, diagnosed and managed 3.45% of the total delivery cases as GDM. This figure is comparable to a similar study by Khan et al. in 1988–1989 at the Aga Khan University Hospital [*3*] where they obtained a figure of 3.2%. Another study done in Kuwait by Johnstone et al. [*6*] in 1985 gave results of GDM being present in 3.1% of all deliveries. The screening for GDM in the Aga Khan University Hospital was done by subjecting the gravid woman not known to be diabetic before the onset of pregnancy, to a 75 g glucose challenge test on the first antenatal visit, irrespective of the gestational age. Fasting was not required. A dose of 75 g glucose was dissolved in 300 ml water and administered orally over a 5-minute period. A single venous blood sample was obtained 2 hours later for determining the plasma glucose. If the result was >140 mg%, then a formal 3-hour oral glucose tolerance test (OGTT) with a glucose load of 75 g was performed. The diagnostic levels were based on the modified O'Sullivan's criteria. Plasma glucose values of >105 mg%, >186 mg%, >140 mg% and >122 mg% for the fasting, 1-hour, 2-hour and 3-hour samples, respectively, were regarded as abnormal. Two abnormal values were required to establish GDM [*3*].

In Kuwait there is no systematic programme for screening of diabetes in pregnancy. Testing is performed when indicated. The diagnostic criteria used in the study centres for GDM were FBG ≥104 mg% on two occasions; IGT was de-

fined as plasma glucose level of >144 mg% 2 hours after a 75 g load with FBG <104 mg%.

Non-insulin-dependent diabetes mellitus (NIDDM) has acquired dramatically high figures in Native American tribes [7], and a study of Zuni Indian women for GDM gave a prevalence of 14.5% [8].

In our study pregnant women with GDM were allowed to go into spontaneous labour at term unless, due to an unusual obstetric indication, an elective caesarean section had to be performed. Emergency caesarean section was undertaken mainly in cases of fetal distress.

The outcome of the pregnancies was encouraging, with perinatal loss being only 2.08% during the three year period. Review of the outcome of pregnancies in women with normal glucose tolerance, in the same period, gave a figure of 2.0% loss. Eighteen females with pre-existing diabetes mellitus delivered in these three years. The loss encountered in this group was 16.6%. The figure for neonatal and intrauterine deaths from the Kuwait study was 12.4% [6]. This high loss rate may be attributed to the high prevalence of type II diabetes in cases discovered in pregnancy. Many of the women were diagnosed in early pregnancy, indicating that the pre-existing diabetes had not been recognized earlier. This factor, along with poor patient compliance and inadequate monitoring and diabetes control, as well as the absence of standardized treatment, may have been the major factors for the high perinatal loss noted in that study [6]. No perinatal mortality was reported by Coustan and Lewis in their study performed in 1973 [9].

The mean birth weight of the infants, 3.33 kg 3.24 kg and 3.17 kg, respectively, in the three study years is again an indication of a satisfactory glycaemic control during pregnancy. This compares well with the Coustan and Lewis [9] study where the mean birth weight was recorded as 3.6 kg.

It may be concluded from the study that early screening of pregnant women gives an early diagnosis of GDM. Good management, close monitoring and patient compliance give a satisfactory outcome for an infant of normal weight, low incidence of perinatal losses and a natural at-term delivery.

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*Documents on diabetes available from the Regional Adviser, Non-Communicable Diseases, WHO Regional Office for the Eastern Mediterranean. PO Box 1517, Alexandria 21511, Egypt.*