Screening for gestational diabetes, Ahmedabad, India

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Objective To implement a community-based screening and awareness-raising project for gestational diabetes in Ahmedabad, India.

Methods The project took place between April 2016 and August 2019 in Ahmedabad. Medical college faculty members and medical officers trained 3582 paramedical staff on screening for gestational diabetes. These paramedical staff tested all pregnant women 24–28 weeks gestation, who were attending village health and nutrition days – also called mamta days – in urban and rural health centres for routine antenatal care, for gestational diabetes. An oral glucose tolerance test was used and blood sugar ≥ 7.8 mmol/L was the cut-off for gestational diabetes. Women with gestational diabetes were referred for counselling and treatment and all women were followed until 6 weeks after delivery.

Findings Of 53,522 pregnant women screened, 6,786 (12.7%) had gestational diabetes and were referred for nutritional therapy or medication; 836 (12.3%) of these women started medication. There was no significant difference in the prevalence of stillbirths between women with gestational diabetes (0.8%; 54/6,786) and women without (0.7%; 338/46,736; P-value: 0.51). Of the women on treatment, 38 had abnormal blood glucose after delivery and continued with the medication. Two women with gestational diabetes died; they had other associated co-morbidities – pre-eclampsia and anaemia.

Conclusion We found a high prevalence of gestational diabetes, indicating the need for gestational diabetes screening and implementation of this project on a larger scale. Gestational diabetes screening at the community level is operationally feasible using the existing human resources and infrastructure of the reproductive health programmes.

Introduction

Gestational diabetes mellitus is defined by the American Diabetes Association as, “Any degree of glucose intolerance with its onset or first recognition during pregnancy.” If not diagnosed and managed adequately, gestational diabetes may have severe life-threatening consequences for the mother, such as pre-eclampsia and obstructed labour, and for the unborn baby, such as preterm birth, macrosomia and shoulder dystocia. Furthermore, women with gestational diabetes and their offspring are at an increased risk of developing type 2 diabetes later in life. An estimated 21.1 million live births (16.7% of all live births) in 2021 were affected by hyperglycaemia in pregnancy, and of these, 80.3% were due to gestational diabetes. Creating awareness of diabetes in general and gestational diabetes specifically, and screening for and prompt management of gestational diabetes, can reduce its worst consequences. A single initiative of opportunistic screening of women for diabetes during pregnancy can thus have multiple benefits.

Ahmedabad, Gujarat State, has a population of 7,214,225. People in Ahmedabad are at a higher risk of developing diabetes, because of: a preference for high-fat diets; increased access to modern amenities and hence a more sedentary lifestyle; adoption of a westernized lifestyle; and growing urbanization and industrialization. In a 2011 study, the prevalence of type 2 diabetes in Ahmedabad was found to be 13.8% (125/904). However, no recent estimates of gestational diabetes in women in Ahmedabad or Gujarat are available. No guidelines are available on universal screening for gestational diabetes among pregnant women under the reproductive and child health programme at the state level. Hence, most women and health-care workers are unaware of these issues.

The government in Gujarat provides diabetes care through noncommunicable disease clinics. Diagnostic facilities are available at community health centres (secondary-care level) and management is undertaken by the general internal medicine department at district hospitals (tertiary-care level). However, facilities and trained health-care providers are lacking at primary health-care centres and community health centres compared with private health-care facilities that provide services for the management of gestational diabetes. These private facilities are too expensive for low- and middle-income communities.

The Indian government introduced a programme for reproductive, maternal, neonatal, child and adolescent health in February 2013 to improve, among other things, the health of children and women of reproductive age to achieve millennium development goals 4 and 5 as well as the current sustainable developmental goals. Under the reproductive and child health or the sexual and reproductive health programme in Gujarat, village health and nutrition days – more commonly known as mamta days – are routinely held at the village level to provide a basic antenatal care package for pregnant women and immunization for children up to the age of 5 years. Mamta days are held on a fixed day every month and at a fixed site, and provide preventive and promotive health services to pregnant and lactating mothers, women of reproductive age (15–49 years), adoles-
cents and children younger than 5 years. Screening for gestational diabetes is not part of routine antenatal care services in India, but identification of gestational diabetes in pregnant women is critical in view of its wide prevalence and the impact it has on pregnancy outcomes. A review undertaken to understand the challenges of and recommendations on gestational diabetes care in India highlighted the need for capacity-building for health-care workers, especially in resource-limited settings. The review also indicated a need to improve health education among pregnant women on self-management of gestational diabetes.

We report on a pilot project which first trained health-care providers on gestational diabetes and screening during antenatal care, and then used these trained staff to screen for and raise awareness of gestational diabetes among pregnant women attending village health and nutrition days – *mamta* days – for antenatal care.

**Methods**

**Study design and setting**

This was a cross-sectional study with follow-up. Pregnant women between 24 and 28 weeks gestation (the best time to screen for gestational diabetes) attending antenatal care were eligible for inclusion in the project. This project took place in Ahmedabad city (urban) and Ahmedabad district (rural) – population 7.2 million – from December 2016 to April 2019. The project included 72 urban primary health-care centres, 42 rural primary health-care centres, four community health centres and seven medical college hospitals in urban areas and 10 community health centres in rural areas (secondary- and tertiary-care facilities). Health workers screened the pregnant women for gestational diabetes during *mamta* days (every Wednesday) at the urban health centres and primary health-care centres and at antenatal care clinics at the secondary- and tertiary-care facilities. Women found to have gestational diabetes were referred to or further followed up at the community health centres or hospitals.

**Study stages**

The study had three stages: (i) training and capacity-building of health-care personnel; (ii) screening of pregnant women for gestational diabetes and raising their awareness of gestational diabetes and diabetes prevention; and (iii) follow-up of the screened women with gestational diabetes for the outcome (pregnancy outcome and treatment needs during and after delivery).

**Box 1. Training sessions and materials on gestational diabetes and topics covered, Ahmedabad, India**

**Training of trainers**

- Epidemiology of diabetes; management of diabetes (pharmacological and non-pharmacological);
- gestational diabetes; gestational diabetes project details (objectives and activities, form for data collection, and monitoring, data recording and reporting formats).

**On-site training of paramedical field staff**

- Diabetes: risk factors for diabetes; types of diabetes; symptoms; early detection (screening); preventive measures; and foot care.
- Gestational diabetes: explanation of gestational diabetes; causes of gestational diabetes; effect on mother and child; need for management; glucose tolerance testing (video and practical demonstration); information education and communication activities (content, when and how to carry out); and data collection and maintenance of records.

**Information, education and communication sessions and pamphlets for pregnant women**

- Scale of gestational diabetes; risk factors for gestational diabetes; effect on mother and fetus; oral glucose tolerance testing; management of gestational diabetes; precautions during delivery and postnatal period; and preventive steps.

**Group discussions or lectures for women during *mamta* day sessions**

- Awareness-raising of gestational diabetes; steps to prevent diabetes in women and their offspring in the future.

**Training and capacity-building**

We trained medical college faculty members and medical officers so that they could further train paramedical staff (Box 1). The training materials on gestational diabetes were prepared in the local Gujarati language and included information about gestational diabetes, data collection and reporting. The faculty members and medical officers then trained paramedical staff; this training took place in the urban health centres or medical colleges or at the Ahmedabad Municipal Corporation’s offices in urban areas and in the taluka (district administrative division) health office. In addition, trained medical officers and staff nurses trained newly recruited paramedical field staff on site (Box 1).

**Screening and awareness-raising**

During routine house visits, accredited health workers under the reproductive and child health or the sexual and reproductive health programme identified pregnant women between 24 and 28 weeks gestation and informed them about the objectives of the study. In addition, female health workers identified women when they attended *mamta* days and staff nurses identified women when they attended antenatal care clinics. Trained paramedical staff carried out opportunistic screening of pregnant women for gestational diabetes during the *mamta* days. Similarly, trained staff nurses screened women at secondary and tertiary facilities in urban areas during their routine antenatal visits.

The criteria for gestational diabetes followed the national guidelines, that is, a single-step test using 75 g of glucose dissolved in 300 mL of water at 24–28 weeks of pregnancy. We also covered pregnant women between 22 and 30 weeks gestation who may have been missed due to the non-availability of screening at 24–28 weeks.

Women were screened irrespective of the time of their last meal and drank the solution within 5 minutes. Blood glucose was evaluated after 2 hours using a standardized glucometer. If vomiting occurred within 30 minutes of glucose load, the test was repeated. However, if vomiting happened after 30 minutes, no retesting was done and the original test was used. A single plasma glucose level ≥ 7.8 mmol/L after 2 hours was the cut-off for gestational diabetes. The non-response rate was 4.8% (2676/56 198), mainly due to vomiting after taking the 75 g of glucose dissolved in water and declining to take the test again. We only included women who completed the screening test during the analysis (*n* = 53 522).

Health workers used flip charts and information, education and communication videos to educate women about reproductive age and pregnant women about gestational diabetes. They also distributed pamphlets specially designed for screening and awareness-raising.
the pregnant women who took the oral glucose tolerance test (Box 1).

Representatives of the company that provided the glucometers came regularly to calibrate them. Blood glucose was tested at or after 2 hours, but no later than 2 hours and 15 minutes. To ensure time accuracy, health workers and staff nurses recorded the time of glucose ingestion and testing in the data collection tool.

We used a three-tier system to monitor the process of screening for gestational diabetes among the pregnant women. Medical officers of health centres attended four sessions at sites within their jurisdiction every month for quality assurance and submitted a quality report to the project office. Similarly, district and state health authorities checked the quality of glucose tests during their routine monitoring. Consultants from the Department of Preventive Medicine and Obstetrics–Gynecology of the medical college carried out external monitoring and submitted a report of their visits to the principal investigators. Repeat testing was done for any invalid tests or if the quality of the data had been affected; however, the numbers were negligible.

Medical officers sent weekly reports based on supervisor registers to monitor progress of gestational diabetes screening. We held review meetings with health supervisors (based on zones in urban areas and taluka in rural areas) for the proper documentation, referral of women with gestational diabetes, timely reporting and refresher training.

**Follow-up**

Medical officers counselled women found to have gestational diabetes and referred them to higher centres for appropriate care and delivery. The project followed all women included in the study until delivery or up to 6 weeks after delivery to record their prescribed medications and pregnancy outcomes. Auxiliary nurse midwives followed up the women with gestational diabetes during pregnancy because of locally prevailing customs (women going to their parents’ home after the seventh month of pregnancy to have delivery there) and delivery.

**Analysis**

We report frequencies and percentages for the number of women screened, number needing medication and outcomes (successful delivery, stillbirth and treatment needed after delivery). We used a data entry agency which used Excel (Microsoft, Redmond, United States of America) for data entry and verification to minimize error and for data analysis.

**Ethical considerations**

The Ahmedabad Municipal Corporation’s Medical Education Trust Ethics Committee provided institutional ethical clearance before starting the project. All the women included in the study gave written informed consent to participate.

**Results**

In the training of trainers, 304 faculty members, residents and medical officers received training on teaching paramedical staff about gestational diabetes (Table 1). A further 43 doctors received training during field training of paramedical staff. A total of 3582 paramedical staff received training on gestational diabetes; 2084 (58.2%) were from urban areas and 1498 (41.8%) were from rural areas (Table 1).

Through the information, education and communication campaign, we reached 651 369 women – more than the targeted 300 000 women – with information and material on gestational diabetes. The trained health-care staff screened 53 522 pregnant women for gestational diabetes, more than the target of 50 000 women. Of the women screened, 37 690 (70.4%) were from urban health centres, 14 078 (26.3%) were from primary health-care centres, 1294 (2.4%) were from referral centres and 460 (0.9%) from community health centres.

Most of the 53 522 women in the study were in the age group 20–30 years (44 937; 84.0%), while 5789 (10.8%) were younger than 20 years, 2791 (5.2%) were 30–40 years of age and five were older than 40 years (0.0%). One third of the women (35.2%; 18 817/53 522) had a primary-school education, 26.6% (14 252/53 522) had a secondary-school education, 16.5% (8851/53 522) were able to read and write, 10.9% (5844/53 522) were educated beyond secondary school and 10.8% (5758/53 522) were illiterate.

Of the 53 522 pregnant women screened, 6786 (12.7%) had gestational diabetes: blood glucose ≥ 7.8 mmol/L (Table 2). They were referred to higher level health-care centres for further diagnosis and management. Of these women, 836 (12.3%) had to start anti-diabetes medication. The distribution of the women with gestational diabetes by the type of health centre is shown in Table 2. A greater proportion of women at community health centres and referral centres had gestational diabetes than women at urban and rural health centres.

Female health workers at the rural centres or staff nurses at the urban centres encouraged all the women to have an institutional delivery. Almost half of the women (49.4%; 26 466/53 522), both with and without gestational diabetes, attended private hospitals for delivery and health care.

Two of the 6786 pregnant women with raised blood glucose died; they had other associated co-morbidities – pre-eclampsia and anaemia. Three deaths occurred among the women without gestational diabetes. Out of 392 stillbirths reported, 54 (13.8%) of the mothers had gestational diabetes, giving a prevalence of 0.8%. Among the women without gestational diabetes, 0.7% (338/46 736) had a stillbirth ($\chi^2 = 0.43; P$-value: 0.51).
Of the 836 women on treatment for gestational diabetes, 38 (4.5%) had abnormal blood glucose even after delivery and continued on antidiabetes medication: 14 were on insulin and 24 on orally administered antihyperglycaemic medicines.

Since the screening activity was integrated in the manta sessions and training was done inhouse among current staff in available venues (health centres and corporation buildings), the costs of the pilot project were modest. The main cost was for the glucose powder and glucometer strips which was covered by the project funding agency.

**Discussion**

In this pilot project, the trained health workers successfully screened 53 522 pregnant women for gestational diabetes and educated more than 600 000 women about diabetes and gestational diabetes control. The results of the project show that this screening was feasible with the current logistics and contact opportunities with pregnant women and so it could be expanded within the state and later, with supportive evidence, within all India.

*Manta* days are held every Monday at community and primary health centres and every Wednesday at the community level – as outreach sessions in primary health centre catchment areas and sub-centres. They are held 2–3 days a week in urban areas, where reproductive and child health services are provided. 13,24

Thus, these days provide a good opportunity to reach the relevant women and children. The plan of the project was to integrate gestational diabetes screening and awareness-raising within the existing reproductive and child health programme. Hence, no separate personnel or infrastructure was needed to implement the project. Health workers (female health workers and accredited social health activists) are the ground staff who are already in contact with the pregnant women during their second trimester (24–28 weeks). Therefore, we can use these opportunities for screening and raising awareness among attendees of health facilities or outreach community camps through *manta* days. 24

Furthermore, this screening used the oral glucose tolerance test 13,14 at the community level, which is operationally feasible. 22 Testing the pregnant women in the community 2 hours after taking the oral glucose was not difficult. The prevalence of gestational diabetes among the women screened was 12.7%. This prevalence is higher than that found in studies in rural central India (1.9%; 11/575), 22 New Delhi (5.7%; 170/2970) 23 and Haryana (7.1%; 43/607) 24 but lower than the prevalence in Assam (16.7%; 202/1212). 25 This higher prevalence indicates the need for implementation of this project on a wider scale during the second trimester, 24–28 weeks. The women who had gestational diabetes were referred and followed up for management and treatment. Diagnosis in this period allows enough time for the health-care provider and pregnant women to control blood glucose levels and reduce the adverse effects of gestational diabetes on mother and baby. Without this pilot project, all the women screened and found positive for gestational diabetes would have gone undiagnosed and untreated. Prompt referral and further management can be a challenge during screening for gestational diabetes. 3 However, in our pilot project, all the women with gestational diabetes were referred and treated, as accredited social health activists and female health workers undertook routine follow-up of the women for their treatment and delivery. Adherence to medication was also checked and institutional delivery was ensured.

One of the fetal complications of gestational diabetes is stillbirth. As a result of the screening process and the timely referral and management of the women with gestational diabetes, we found no substantial difference in the prevalence of stillbirth among women with gestational diabetes and those without. These rates are lower than the rates found in a study in south India (3%; 4/139 fetal demise among gestational diabetic mothers compared to none in the control group). 26 Screening for gestational diabetes provides an opportunity to sensitize women about the prevention and control of diabetes through healthy diet and lifestyle and hence reduces the risk of stillbirth.

To achieve the objectives of screening for gestational diabetes and improving awareness and motivation, certain elements are essential, namely: attendance at the right health centre at the right gestational age; local screening; and complete testing and test reporting to allow further management. 20 Our project had all these elements and hence achieved its objectives.

Both the pregnant women and the health workers responded positively to the screening. Furthermore, the operational feasibility and smooth running of the screening project at the community level show that screening for gestational diabetes can be established as a routine procedure during pregnancy. This project model can be integrated in the reproductive and child health programme, not only in one state but in the whole country, and indeed in other countries that have sound maternal and child health programmes.

Under the Indian National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke, all primary, secondary and tertiary health centres are well equipped for the diagnosis and management of diabetes. The costs of test material such as glucose powder and glucometer strips were covered by the project funding agency. Any country or region that has an active diabetes control programme and reproductive health programme can replicate this project at little cost, with no additional infrastructure and without placing an extra burden on the health-care personnel. It thus provides a way to reduce maternal and child morbidity and mortality.

### Table 2. Women screened for gestational diabetes, by health centre and test result, Ahmedabad, India, 2016–2019

| Type of health centre       | Gestational diabetes, no. (%) | Total no. |
|-----------------------------|-------------------------------|-----------|
|                             | Positive                      | Negative  |
| Urban health centre         | 4754 (12.6)                   | 32 936 (87.4) | 37 690 |
| Primary health centre       | 1541 (10.9)                   | 12 537 (89.1) | 14 078 |
| Community health centre     | 121 (26.3)                    | 339 (73.7)   | 460    |
| Referral centre             | 370 (28.6)                    | 924 (71.4)   | 1 294  |
| Total                       | 6 786 (12.7)                  | 46 736 (87.3) | 53 522 |

Note: Gestational diabetes was defined as pregnant women 24–28 weeks gestation who had blood sugar ≥ 7.8 mmol/L, after an oral glucose tolerance test.
After successful completion of the project, an operational feasibility report was submitted to Government of Gujarat. Based on the success of the project, the Maternal and Child Health Division of the Ministry of Health and Family Welfare organized operational training on gestational diabetes through Zoom with relevant stakeholders in India, including state health directors, United Nations Children’s Fund and Jhpiego (formerly Johns Hopkins Program for International Education in Gynecology and Obstetrics) consultants, on 13 December 2019. Ahmedabad city continued gestational diabetes screening activities after completion of the project without external financial assistance. State-level expansion of the project is underway, although it has been delayed because of the coronavirus disease 2019 pandemic.

This study has a few limitations. Since it was a pilot project, it covered only one district and city. Nonetheless, the project succeeded in training many personnel and screening and following up a large number of women using a simple and practical process, which suggests it can easily be extended to the entire country in stages. A structured programme will be required to have a common platform for training the health workers. The glucose powder packets supplied contained 150 g of powder, from which 75 g were used for the oral glucose tolerance test. Later in the study process, we were able to procure 75 g packets after due advocacy. Packs with the exact required quantity would help save time and increase the precision of the dose in routine practice. Certain logistics, such as staff recruitment, training and specific timing of the screening process on specific sessions of mamta days, may need to be worked out further, which could be done with liaison with the reproductive and child health programme.

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Competing interests: None declared.
Авторы обнаружили высокую распространенность гестационного диабета среди беременных женщин. Из 53 522 беременных женщин, прошедших скрининговое обследование, 6786 (12,7%) имели гестационный диабет. Женщин с гестационным диабетом направляли на консультацию и лечение. Все женщины наблюдались в течение 6 недель после родов. Две женщины с гестационным диабетом продолжали принимать лекарства. Две женщины с гестационным диабетом умерли; их диабет был связан с другими заболеваниями.

Результаты

Всем беременным женщинам, обследованным в рамках проекта, был пороговый уровень для гестационного диабета. Женщин с гестационным диабетом направляли на диетотерапию или медикаментозное лечение, а 836 (12,3%) из этих женщин начали принимать лекарства. Не наблюдалось существенной разницы в распространенности мертворождений между женщинами с гестационным диабетом (0,8%; 54/6786) и женщинами без гестационного диабета (0,7%; 338/46 736; P-значение: 0,51). Среди женщин, которые получали лечение, у 38 после родов наблюдался анемический уровень глюкозы, поэтому они продолжали принимать лекарства. Двое женщин с гестационным диабетом умерли; их диабет был связан с другими заболеваниями.

Conclusion

Nous avons constaté une forte prévalence du diabète gestationnel, d’où la nécessité de dépister et de déployer ce projet à plus grande échelle. Le dépistage du diabète gestationnel au niveau communautaire est faisable sur le plan opérationnel avec les infrastructures et ressources humaines existant dans le cadre des programmes de santé reproductrice.

Méthodes

Le projet s’est déroulé entre avril 2016 et août 2019 à Ahmedabad. Des médecins et membres de la faculté de médecine ont formé 3582 paramédicaux en technique de dépistage du diabète gestationnel. Ces paramédicaux ont testé toutes les femmes enceintes de 24 à 28 semaines ayant assisté à des journées locales consacrées à la santé et à la nutrition – également appelées journées mamta – dans les centres de santé urbains et ruraux dédiés aux soins prénataux de routine, afin de détecter un éventuel diabète gestationnel. Ils ont utilisé des tests oraux de tolérance au glucose et fixé la limite à ≥ 7,8 mmol/L pour le taux de glycémie. Les femmes présentant un diabète gestationnel ont ensuite été envoyées en consultation et reçue un traitement; toutes ont été suivies jusqu’à 6 semaines après l’accouchement.

Sur 53 522 femmes enceintes dépistées, 6786 (12,7%) souffraient de diabète gestationnel et se sont vu proposer une thérapie nutritionnelle ou des médicaments; 836 (12,3%) d’entre elles ont entamé un traitement. Aucune différence notable n’a été observée en matière de prévalence des mortinairesses chez les femmes atteintes de diabète gestationnel (0,8%; 54/6786) par rapport aux autres (0,7%; 338/46 736; valeur-p: 0,51). Sur l’ensemble des femmes sous traitement, 38 présentaient un taux de glycémie anormal après l’accouchement et ont continué à prendre des médicaments. Deux femmes souffrant de diabète gestationnel sont décédées; leur diabète était associé à d’autres comorbidités – prééclampsie et anémie.

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cibado de la diabetes gestacional. Este personal paramédico realizó pruebas de diabetes gestacional a todas las mujeres embarazadas de entre 24 y 28 semanas de gestación que asistían a las jornadas de salud y nutrición de las aldeas, también llamadas jornadas mambí, en los centros sanitarios urbanos y rurales para la atención prenatal de rutina. Se utilizó una prueba de tolerancia oral a la glucosa y se estableció un límite de glucemia ≥7,8 mmol/L para detectar la diabetes gestacional. Las mujeres con diabetes gestacional fueron remitidas para recibir asesoramiento y tratamiento y se realizó un seguimiento de todas ellas hasta 6 semanas después del parto.

**Resultados** De 53 522 mujeres embarazadas sometidas a cribado, 6786 (12,7 %) tenían diabetes gestacional y fueron remitidas para recibir un tratamiento nutricional o medicamentos; 836 (12,3 %) de estas mujeres iniciaron la medicación. No hubo diferencias significativas en la prevalencia de moratones entre las mujeres con diabetes gestacional (0,8 %, 54/6786) y las mujeres que no la padecían (0,7 %, 338/46 736; valor de p: 0,51). De las mujeres en tratamiento, 38 tuvieron una glucemia anormal después del parto y continuaron con los medicamentos. Dos mujeres con diabetes gestacional murieron; tenían otras comorbilidades asociadas: preeclampsia y anemia.

**Conclusión** Se detectó una alta prevalencia de diabetes gestacional, lo que indica la necesidad de realizar el cibado de la diabetes gestacional y de aplicar este proyecto a mayor escala. El cibado de la diabetes gestacional a nivel local es factible desde el punto de vista operativo utilizando los recursos humanos y la infraestructura existentes en los programas de salud reproductiva.

**References**

1. Karagannis T, Bekaria E, Manolopoulos K, Paletas K, Tsapas A. Gestational diabetes mellitus: why screen and how to diagnose. Hippokratia. 2010 Jul;14(3):151–4. PMID: 20981162
2. Chen Y, Wu Q, Zhang L, Chen D, Liang R. Relationship of abnormal mid-term oral glucose tolerance test and maternal weight gain with adverse pregnancy outcomes in women with gestational diabetes mellitus. Zhejiang Da Xue Bao Yi Xue Ban. 2021 Jun 25;50(3):313–9. doi: http://dx.doi.org/10.3724/zbbyxb-2020-0013 PMID: 34402256
3. Farrar D, Simmonds M, Bryant M, Sheldon TA, Tuffnell D, Golder S, et al. Hyperglycaemia and risk of adverse perinatal outcomes: systematic review and meta-analysis. BMJ. 2016 Sep 13;354:i4694. doi: http://dx.doi.org/10.1136/bmj.i4694 PMID: 27624087
4. Rani PR, Begum J. Screening and diagnosis of gestational diabetes mellitus: where do we stand. J Clin Diagn Res. 2016 Apr;10(4):QE01–04. doi: http://dx.doi.org/10.7060/JCDR/2016/67858.7689 PMID: 27190902
5. Morampudi S, Balasubramanian G, Gowda A, Zomorodi B, Patil AS. Prevalence and predictors of gestational diabetes mellitus care in India: a review. Front Endocrinol (Lausanne). 2017 Mar 24;8:56. doi: http://dx.doi.org/10.3389/fendo.2017.00056 PMID: 28392778
6. Nabi T, Rafiq N, Trigotra S, Mishra S. Clinical characteristics, outcomes, and progression to type 2 diabetes in women with hyperglycemia in pregnancy. Indian J Endocrinol Metab. 2021 Nov;25(11):538–44. doi: http://dx.doi.org/10.4103/ijem.jem_440_21 PMID: 35355915
7. Diabetes facts & figures [internet]. Brussels: International Diabetes Federation, 2021. Available from: https://idf.org/aboutdiabetes/what-is-diabetes facts-figures.html [cited 2022 Feb 6].
8. IDF diabetes atlas, 10th edition. Brussels: International Diabetes Federation; 2021. Available from: www.diabetesatlas.org [cited 2022 Feb 6].
9. Jain R, Olejas S, Jain R. Hyperglycemia in pregnancy (HIP) reduces perinatal, infant morbidity & mortality as a result of a large prospective cohort learn from UP, India. Int J Diabetes Metab Disord. 2018;3(3):1–5.
10. Gestational diabetes awareness & screening, WDF14-877. Baguward: World Diabetes Foundation. 2016. Available from: http://www.worlddiabetesfoundation.org/projects/india-wdf14-877 [cited 2022 Feb 6].
11. National guidelines for diagnosis & management of gestational diabetes mellitus. New Delhi. Ministry of Health and Family Welfare Government of India, 2014.
12. National programme for prevention & control of cancer, diabetes, cardiovascular diseases and stroke (NPCDCS): New Delhi. Ministry of Health and Family Welfare, Government of India. 2010. Available from: https://nhm.gov.in/index1.php?lang=1&1&sublinkid=104864&lid=604 [cited 2022 Feb 6].
13. National Health Mission. RMNCH+A [internet]. New Delhi: Ministry of Health and Family Welfare, Government of India. 2013. Available from: https://nhm.gov.in/index1.php?lang=1&1&sublinkid=79&lid=168 [cited 2022 Feb 6].
14. Nath A. India’s progress toward achieving the Millennium Development Goals. Indian J Community Med. 2011 Apr;36(2):85–92. doi: http://dx.doi.org/10.4103/0970-0218.81418 PMID: 21976700
15. The 17 goals. Sustainable Development. New York, NY: United Nations; 2015. Available from: https://sdgs.un.org/ goals [cited 2022 Feb 6].

16. Health department [internet]. Ahmedabad: Amdavad Municipal Corporation, 2022. Available from: https://ahmedabadcity.gov.in/portal/jsp/Static_pages/health_department.jsp [cited 2022 May 27].
17. Tripathi R, Verma D, Gupta VK, Tyagi S, Kalavani M, Ramji S, et al. Evaluation of 75 g glucose load in non-fasting state [Diabetes in Pregnancy Study group of India (DIPS) criteria] as a diagnostic test for gestational diabetes mellitus. Indian J Med Res. 2017 Feb;145(2):209–14. PMID: 28639597
18. Carmina E, Stanczyk FZ, Lobo RA. Evaluation of hormonal status. In: Strauss JF, Barbieri RL, Gargiulo AR, editors. Yen and Jaffe’s reproductive endocrinology, physiology, pathophysiology, and clinical management. 8th ed. Amsterdam: Elsevier; 2019. doi: http://dx.doi.org/10.1016/978-0-323-47912-7.00003-2
19. Li KT, Naik S, Alexander M, Mathai J. Screening and diagnosis of gestational diabetes mellitus in India: a systematic review and meta-analysis. Acta Diabetol. 2018 June;55(6):613–25. doi: http://dx.doi.org/10.1007/s00592-018-1131-1 PMID: 29582160
20. Government of Gujarat. MAMTA Abhiyan Guidelines. Gandhinagar: Ministry of Health and Family Welfare, Government of Gujarat. 2006.
21. Saghi H, Kamalanathan S, Sahoo J, Lakshminarayanan S, Rani R, Jayalakshmi D, et al. Comparison of different criteria for diagnosis of gestational diabetes mellitus. Indian J Endocrinol Metab. 2015 Nov;19(6):824–8. doi: http://dx.doi.org/10.4103/1309-0566.150787
22. Chebrolu P, Kurbude R, Thakur M, Shah N, Jain R. Gestational diabetes in rural central India: low prevalence but absence of typical risk factors. Helyon. 2021 Jun 28;7(7):e07431. doi: http://dx.doi.org/10.1080/2160-9464.2021.2042621
23. Kumari R, Dalal V, Khachwaha G, Sahoo I, Khadgawat R, Mahey R, et al. Prevalence and predictors of gestational diabetes mellitus in rural Assam: a cross-sectional study using mobile medical units. BMJ Open. 2020 Nov 10;10(11):e037836. doi: http://dx.doi.org/10.1136/bmjopen-2020-037836 PMID: 33172942
24. Prakash GT, Das AK, Habeebullah S, Bhat V, Shamanna S. Maternal and neonatal outcome in mothers with gestational diabetes mellitus. Indian J Endocrinol Metab. 2017 Nov-Dec;21(6):854–8. doi: http://dx.doi.org/10.4103/ijem.IJEM_582_17 PMID: 29535949
25. Raipur R, Yadav Y, Nanda S, Raipur M. Prevalence of gestational diabetes mellitus & associated risk factors at a tertiary care hospital in Haryana. Indian J Med Res. 2013 Apr;137(4):728–33. PMID: 23703340
26. Chanda S, Dogra V, Hazanka N, Bambrah H, Sudke AK, Vig A, et al. Prevalence and predictors of gestational diabetes mellitus in rural Assam: a cross-sectional study using mobile medical units. BMJ Open. 2020 Nov 10;10(11):e037836. doi: http://dx.doi.org/10.1136/bmjopen-2020-037836 PMID: 33172942
27. Nielsen KK, Rhedinélder T, Kapur A, Damm P, Seshiah V, Bygberg LC. Factors influencing timely initiation and completion of gestational diabetes mellitus screening and diagnosis - a qualitative study from Tamil Nadu, India. BMC Pregnancy Childbirth. 2017 Aug 1;17(1):255. doi: http://dx.doi.org/10.1186/s12884-017-1429-y PMID: 28674665