

# Current Practices in Diagnosis and Management of Gestational Diabetes: A Bangladesh Study

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## Abstract

**Background:** In the absence of international or national guidelines for the diagnosis and treatment of gestational diabetes mellitus (GDM), physicians' current practice varies a great deal. This is particularly true for most developing countries, including Bangladesh. We have conducted a study to register the current practices related to the diagnosis and management of GDM in Bangladesh. **Materials and Methods:** A cross-sectional survey was conducted to obtain details regarding diagnostic criteria used, screening methods, management strategies, and postpartum follow-up of GDM using a structured questionnaire. A total of 756 physicians from 30 centers of the Diabetic Association of Bangladesh, Government and Private Hospitals located in both the capital Dhaka city and outside Dhaka participated. **Results:** The study found that diabetologists look after 42.5% of the GDM patients. Among the physicians participated, 44.4% preferred first antenatal care visit for the GDM screening, and 55.2% preferred two samples oral glucose tolerance test (OGTT) for screening. About 47.6% of the physicians followed the American Diabetic Association (ADA) guidelines for diagnosis. Half of the participated physicians preferred short-acting insulin and four-times home monitoring of blood glucose per day. Around 66.3% of the physicians advised OGTT 6 weeks after delivery. **Conclusion:** The majority of the participating physicians do not follow the recommendations for the diagnosis and management of GDM. This emphasizes the need for developing an evidence-based national guideline for GDM and necessary training to halt the rise of diabetes and safe mother and child health in Bangladesh.

**Keywords:** Bangladesh, barrier, clinical practice, gestational diabetes mellitus

## BACKGROUND

Globally, gestational diabetes mellitus (GDM) is increasing, along with type 2 diabetes mellitus (T2DM). In 2019, the International Diabetes Federation (IDF) estimated that 16% of live births were affected with hyperglycemia in pregnancy and in whom 84% reported GDM.<sup>[1]</sup> In Bangladesh, some population-based studies have revealed that the prevalence rates of GDM were

between 6% and 14%.<sup>[2,3]</sup> GDM causes serious health consequences for the mother and the baby. Higher rates of abortion, neonatal death, and stillbirth have been more evident in GDM mothers. GDM mothers and their

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infants are also at increased risk of developing T2DM and related cardiometabolic diseases in the future.<sup>[4,5]</sup>

A study has shown that timely and accurate treatment of maternal hyperglycemia reduces the risk almost to the similar level seen in women without GDM.<sup>[6]</sup> Although there are no globally accepted guidelines for screening and managing GDM, it is essential to set up a national guideline for the diagnosis and management of GDM. Despite several guidelines followed by various organizations, controversy still exists worldwide regarding optimal screening strategies and diagnostic criteria for GDM.<sup>[7]</sup> In developing and underdeveloped countries, the majority of GDM cases remain undetected, and many are detected during a first antenatal checkup and often in late pregnancy. Studies have shown that appropriate diagnosis and management of GDM provide a window of opportunity to prevent future diabetes of women with GDM and their offspring.<sup>[8-10]</sup>

In Bangladesh, women with GDM are taken care of by different healthcare professionals (HCPs), including diabetologists, endocrinologists, and gynecologists. They usually face unique challenges when they interact with GDM women due to a lack of knowledge and lack of care guidelines. One study reported inadequate knowledge about GDM among physicians in Bangladesh.<sup>[11]</sup> Only 52.8% of the physicians had good knowledge about GDM. Data related to current practices in the diagnosis and management of GDM are lacking for Bangladesh. Therefore, this study aims to obtain information on existing practices in the diagnosis and management of GDM among physicians in Bangladesh.

## MATERIALS AND METHODS

### Study design and study sites

This cross-sectional study was part of the Preconception Care Program of Diabetic Association of Bangladesh (BADAS). The study was conducted between August and December 2016 in 30 centers providing diabetes care services in both capital Dhaka city and outside Dhaka city in Bangladesh. The data were collected from eight<sup>[8]</sup> central institutions of Diabetic Association of Bangladesh (BADAS) including outpatient clinic of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine, and Metabolic Disorders (BIRDEM), Bangladesh Institute of Health Sciences Hospital (BIHS), six<sup>[6]</sup> outpatient clinics of National Healthcare Network (NHN) located in Dhaka city, and outpatient clinic of seven<sup>[7]</sup> Affiliate Associations (AAs) from seven administrative divisions of Bangladesh. Along with BADAS and its AAs, Endocrine, and Diabetes unit of Sheikh Mujib Medical University (BSMMU), four<sup>[4]</sup> government medical college hospitals and 10<sup>[10]</sup> private medical colleges, hospitals, and clinics were also selected for this study. A total of 1000 physicians requested, and

among them 756 (75.6%) physicians, including 519 from BADAS and its AAs, 66 from government hospitals, and 171 from private hospitals participated in this study.

### Sampling procedure

A purposive sampling method was adopted, in which physicians covering, diabetologists, endocrinologists, obstetricians, medicine specialists, and gynecologists working at the above-mentioned centers and hospitals were invited to participate in the study.

### Inclusion criteria

The inclusion criteria of the participants were as follows: (i) physicians who take care of the GDM patients; (ii) willing to participate in the study; and (iii) providing informed written consent. Participation was voluntary.

### Data collection and statistical analysis

A panel of experts, including an endocrinologist, diabetologist, gynecologist, and a public health researcher, was involved in developing a structured questionnaire. Our survey questionnaire was first developed in the English language and then translated into the local language Bangla. This pretested questionnaire included 35 questions, including different screening techniques employed, diagnostic guidelines, diagnostic cut-offs based on blood glucose levels, management and follow-up, pharmacotherapy, and postpartum follow-up of GDM care. All the data were presented as a percentage. The data analysis was performed using PASW statistics version 21 for Windows (SPSS Inc., Chicago, IL, USA).

### Ethical policy and institutional review board statement

The protocol was approved by the Ethical Review Committee of the Diabetic Association of Bangladesh with Registration no. BADAS-ERC/EC/16/0100. Research participation, confidentiality, and consent followed the Helsinki declaration.

## RESULTS

### Taking care of glycemic control of women with GDM, by health professionals

Figure 1 shows that 42.5% of the GDM patients were taken care of by diabetologists, 15.5% by endocrinologists, 14.7% by gynecologists, 8.6% by medicine specialists, and 18.7% patients were taken care of in a combined clinic run by both diabetologists/endocrinologists and gynecologists.

### The preferred time for screening GDM (A) and method of screening at the first ANC visit (B)

Figure 2A shows that 44.4% of the participated physicians preferred the first antenatal care (ANC) visit, and 40.5% preferred 24–28 weeks to screen GDM. Around 51.6% of the physicians preferred universal screening,

whereas 48.4% preferred only high-risk-based screening [Figure 2B].

### The preferred blood test for diagnosing GDM

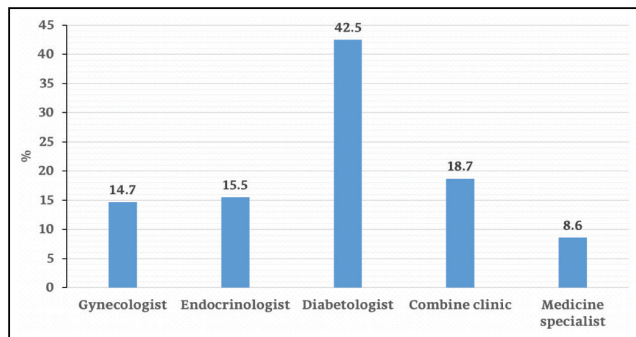
Figure 3 shows that 55.2% of the physicians preferred two samples oral glucose tolerance test (OGTT), 16.3% chose three samples OGTT, 13.9% two-step method (50 g glucose challenge test followed by 2-h OGTT), 8.3% fasting blood glucose (FBG), and 6.3% random blood glucose (RBG) to diagnose GDM.

### The guideline used to diagnose GDM

Among the physicians, 47.6%, 34.5%, and 12.3% had preferred the American Diabetic Association (ADA), World Health Organization (WHO) 2013, and local guidelines, respectively, to diagnose GDM [Figure 4].

### Use of medication and the type of insulin used for glycemic control

About 82.3% of the physicians used insulin and 17.7% used oral anti-diabetic medications (OAD) for glycemic control [Figure 5A]. Among insulin, 49.1% used short-acting, 31.0% split-mixed, 13.7% premixed, and 6.2% basal bolus insulin [Figure 5B]. Related to OAD, 93.2% and 6.8% used metformin and sulfonylureas, respectively.



**Figure 1:** Taking care of glycemic control of women with GDM, by health professionals. GDM = gestational diabetes

### Pattern of dietary advice by health professionals

Among the participants, 24.5% of the physicians gave dietary advice by themselves, and 63.2% of the physicians referred to nutritionists and 12.3% to trained diabetes educator for dietary advice [Figure 6].

### Use of HbA1c for diagnosis and follow-up in GDM

Among the study participants, only 39.4% used HbA1c for diagnosing GDM, and 88.5% used it for glycemic follow-ups [Figure 7A and B].

### Use of home blood glucose monitoring (HMBG)

About 86.9% of the physicians advised HMBG. Among them, 34.1%, 50.0%, and 15.9% recommended HMBG for two, four, and six times daily, respectively [Figure 8A and B].

### Mode of delivery of women with GDM

Among the physicians, 6.6% preferred normal vaginal delivery (NVD), 34.6% cesarean section (C/S), and the rest 58.8% preferred delivery as per indications [Figure 9]. Only 71.8% reported that they followed a glycemic control protocol during the time of labor.

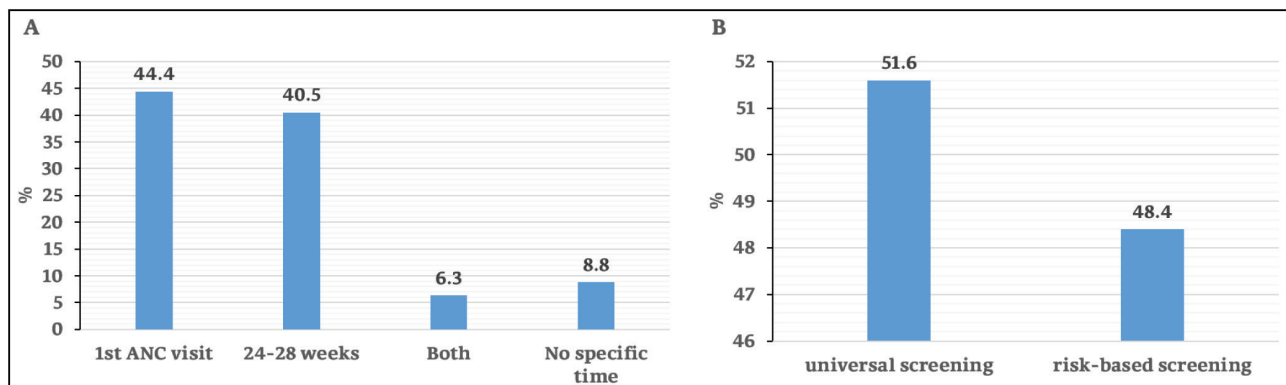
### Postpartum follow-up of women with GDM

Among the physicians, only 66.3% advised OGTT 6 weeks after delivery [Figure 10].

## DISCUSSION

This is the first survey in Bangladesh to obtain information on existing practices in diagnosing and managing GDM among physicians working in 30 leading centers (including centers from all the eight administrative divisions) providing diabetes care in Bangladesh.

The study results showed consistency in screening time and screening method in half of the study participants. Still, there is a disparity in management principles, including initial management strategies. This may be partially explained by the inadequate knowledge of our



**Figure 2:** The preferred time for screening GDM (A) and method of screening at the first ANC visit (B). ANC = antenatal care, GDM = gestational diabetes

physicians about GDM.<sup>[11]</sup> Our survey reveals that among the study centers, the majority of the GDM patients are taken care of by diabetologists, and few are taken care of in the recommended combined clinic run by diabetologists/endocrinologists and gynecologists. That reflects the picture of the lack of specialty clinic care in several centers included in this survey.

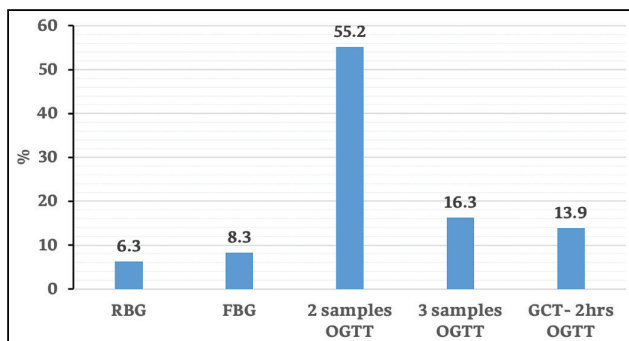
In this survey, most of the study participants prefer 75 g OGTT as diagnostic criteria for GDM as recommended by the ADA guidelines.<sup>[12]</sup> As the prevalence of GDM is rising in the South-East Asia region,<sup>[1]</sup> universal screening is an essential tool for this high-risk ethnic population to

ensure that no case of GDM or pre-existing diabetes is missed out. In this regard, all physicians should screen for diabetes in the first antenatal visit (as opposed to 44.4% in the present survey). Alarming, 8.8% of survey participants did not think of any specific time to be considered for GDM screening. Delay in screening until the second trimester may increase the risk of missing pre-existing (pregestational) diabetes, especially in a population such as Bangladesh, where the background prevalence of T2DM is high and more than 50% of the people with T2DM remain undiagnosed.<sup>[1]</sup> Ideally, all pregnant women should be screened in their first trimester, as was recommended in most of the guidelines.<sup>[12-15]</sup>

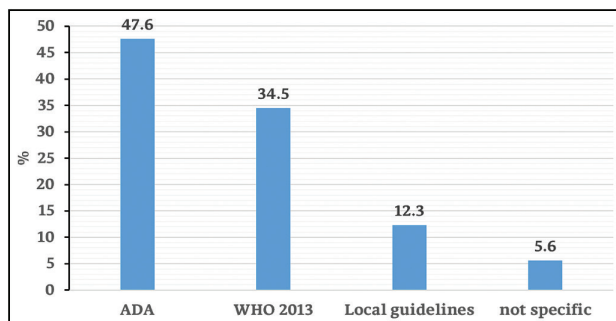
Likely, different definitions for the diagnosis of GDM and frequent changes in recommendations provided by various organizations may have led a confusion among healthcare professionals for their practice. This is reflected by the present study's result, in which the study participants follow up with various guidelines. Among them, 5.6% is not following any guideline for diagnosis of GDM, raising the possibility of over- or under-diagnosis of GDM in Bangladesh. Among the physicians, 47.6% and 34.5% have preferred ADA<sup>[12]</sup> and WHO 2013<sup>[16]</sup> guidelines, respectively, for diagnosing GDM.

Insulin is the first-line therapy for the treatment of GDM. Like many other guidelines, both BADAS and the South Asian Federation of Endocrine Society recommend only insulin for GDM treatment.<sup>[14,15]</sup> There is some evidence that OAD as metformin is safe in pregnancy.<sup>[17]</sup> In some cases, the patient's preference is considered while initiating insulin. Data from our survey show that more than 80% of the physicians used insulin to treat GDM. Short-acting insulin and split-mixed insulin are the most used insulin. A significant number of physicians in our survey also stated that they used OADs. Metformin was the most used OAD in our survey. Our finding is in line with a study conducted in Turkey.<sup>[18]</sup> Access to insulin, needle phobia, and low cost could be the probable causes of using OADs.

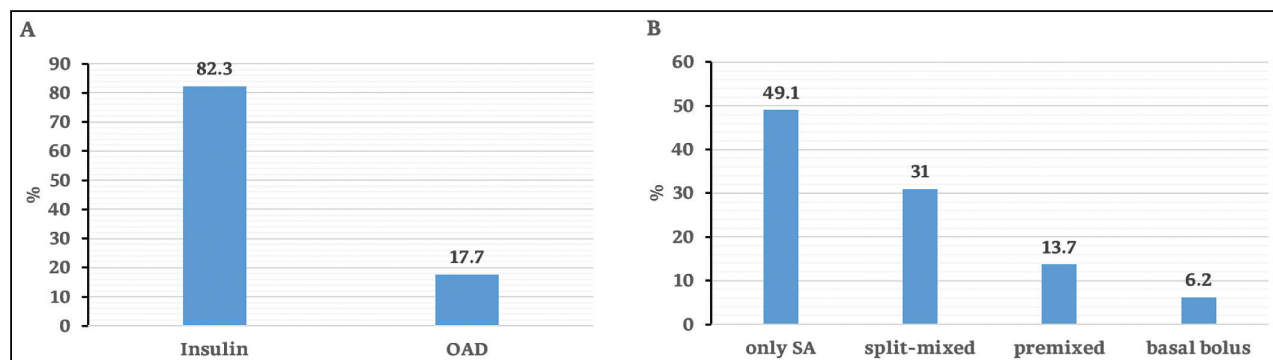
Dietary advice is an integral part of GDM management, and all the guidelines recommended that dietary counseling



**Figure 3:** The preferred blood test for diagnosing GDM. RBG = random blood glucose, FBG = fasting blood glucose, OGTT = oral glucose tolerance test, GCT = glucose challenge test



**Figure 4:** The guideline used to diagnose GDM. ADA = American Diabetic Association, WHO = World Health Organization, GDM = gestational diabetes



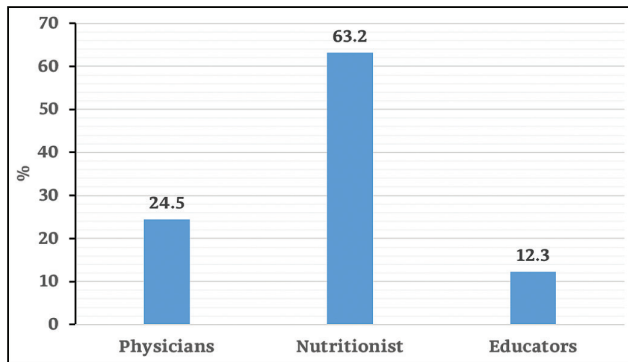
**Figure 5:** Use of medication (A) and the type of insulin used for glycemic control of women with GDM (B). OAD = oral anti-diabetic, SA = short acting, GDM = gestational diabetes



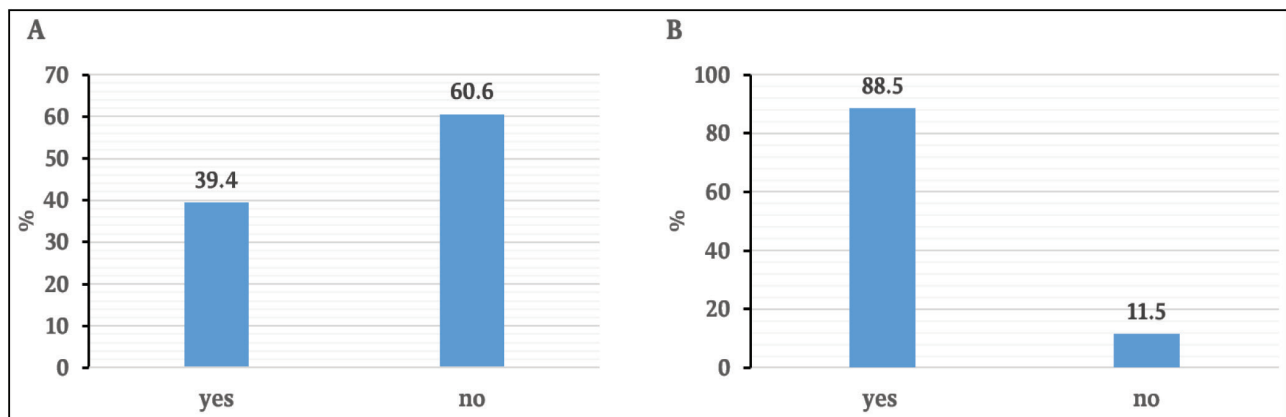
be provided by a trained dietician.<sup>[14,15,19]</sup> More than 60% of the physicians referred their patients to the dietician and trained diabetes educators. In this study, more than 80% of the physicians recommend HMBG. About half of the physicians recommend four times (including fasting and all postprandial blood glucose). Besides fasting glucose, a postprandial glucose assay was recommended in Fifth International Workshop-Conference on GDM.<sup>[20]</sup> A randomized study comparing both preprandial and postprandial blood glucose monitoring in patients

with GDM showed a significant association between postprandial blood glucose monitoring and the improvement of pregnancy and birth outcomes.<sup>[21]</sup> More than 80% of our study participants recommended HbA1c for monitoring glycemic control, and about 40% also used HbA1c for diagnosing GDM. Still, HbA1c is not recommended routinely for diagnosis and monitoring of GDM due to shortened life span of the erythrocyte during pregnancy.<sup>[14,15,19,22]</sup>

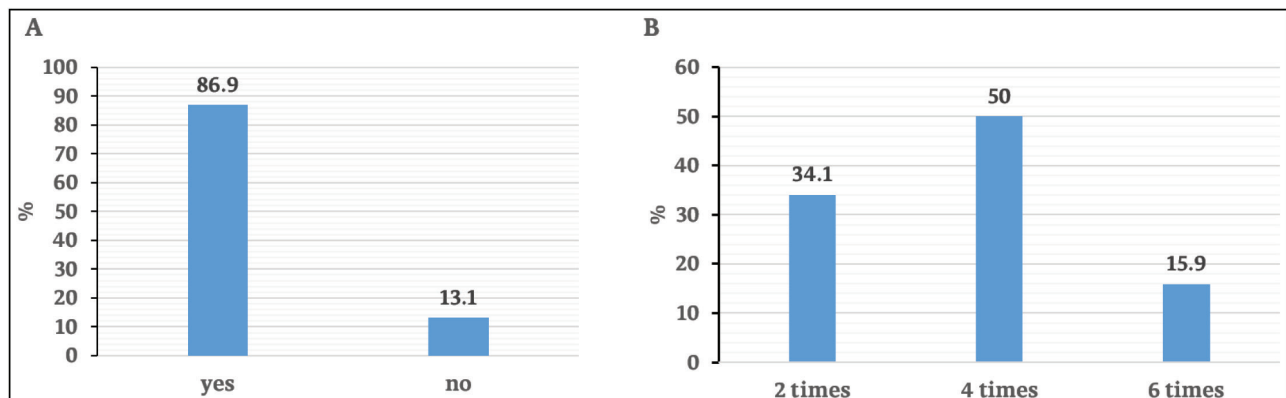
It is mandatory to check postpartum glucose levels in women with GDM. Nearly half of these women will develop T2DM within 5–10 years after delivery.<sup>[5]</sup> These women are also at risk of developing GDM during their subsequent pregnancies. Therefore, regular screening for T2DM should be strongly encouraged. Many organizations have also issued guidelines for postpartum follow-up of women with GDM.<sup>[1,15]</sup> The ADA recommends that every woman with GDM should undergo screening for T2DM with OGTT, 6–12 weeks after delivery.<sup>[19]</sup> Although guidelines stressed the need for postpartum care, the current survey reports that not all participated physicians advised postpartum OGTT. Only 66.3% of the participating physicians recommended postpartum OGTT at 6–12 weeks. Our finding is consistent with results from studies conducted in India<sup>[23,24]</sup> and Turkey.<sup>[18]</sup>



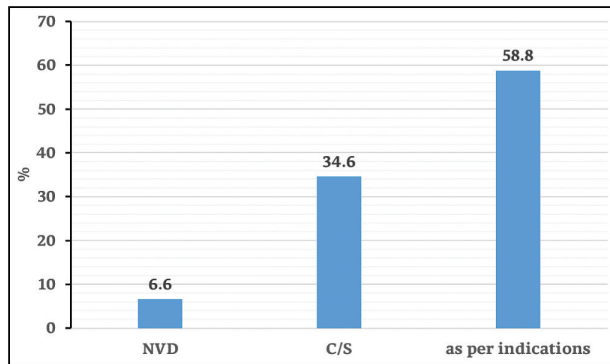
**Figure 6:** Pattern of dietary advice of women with GDM, by health professionals. GDM = gestational diabetes



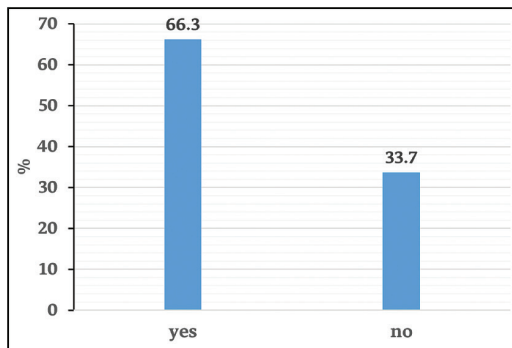
**Figure 7:** Use of HbA1C for diagnosis and follow-up in GDM. GDM = gestational diabetes



**Figure 8:** Use of HMBG for following glycemic control of women with GDM. HMBG = home blood glucose monitoring, GDM = gestational diabetes



**Figure 9:** Mode of delivery of women with GDM. GDM = gestational diabetes, NVD = normal vaginal delivery, C/S = cesarean section



**Figure 10:** Postpartum follow-up of women with GDM. GDM = gestational diabetes

A possible explanation could be that many physicians do not follow these guidelines in practice or may view other healthcare professionals as responsible for the follow-up of the patients.

## CONCLUSION

Majority of the participating physicians do not follow the recommended guidelines for the diagnosis and management of GDM possibly as a consequence of lack of international or national guidelines and necessary training. The data are important for low- and middle-income countries and Bangladesh, in particular, to understand the current practice for clinical management of GDM and help policymakers, clinicians, and researchers as a baseline information for the development of proper guidelines and necessary training for GDM diagnosis and management.

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## Conflicts of interest

There are no conflicts of interest.

## Author contribution

All authors did the literature search and drafted sections of the manuscript. All authors subsequently revised the final manuscript.

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