

## THE CURRENT PRACTICES FOR TESTING FOR HYPERGLYCAEMIA IN PREGNANCY (HIP) IN THE MEDICAL COLLEGE INSTITUTIONS IN INDIA

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### ABSTRACT

#### BACKGROUND

The aim of the study is to determine the current practices in the medical college institutions pan India for testing for Hyperglycaemia in Pregnancy (HIP) to detect gestational diabetes and highlight areas that need additional attention in order to ensure adherence to current national guidelines.

#### MATERIALS AND METHODS

Questionnaires were used to obtain information regarding the testing strategy for hyperglycaemia in pregnancy. The questionnaires were filled out by the teaching faculty of the OB/GYN departments of 47 medical college institutions in India. The perceptions regarding the prevalence of diabetes in pregnancy in India and the needs for capacity building were assessed.

#### RESULTS

Forty seven respondents answered the questionnaires. The majority of respondents (95.83%) reported that all pregnant women were offered (universal) testing for hyperglycaemia in pregnancy and 37.5% reported that women were screened both in early and midtrimester of pregnancy. Most reported that testing for HIP took place once at booking, irrespective of the gestational age (39.58%). Thirty three (70.21%) respondents reported using the single-step nonfasting method to diagnose hyperglycaemia. Furthermore, 21.28% of respondents reported using a glucometer to determine the concentration of blood glucose in plasma, while 68.08% reported using a lab analyser. The instructions for the testing were offered by consultants and postgraduates in a vast majority of cases (87.5%). The staff communicated with the women in a significantly less number of cases (12.5%). 65.96% of respondents felt that all women readily agreed to follow this advice. The majority of respondents (89.35%) reported having noticed an increase in the number of women with hyperglycaemia. Furthermore, 91% of all the respondents felt there was a need to train medical personnel to test and manage hyperglycaemia.

#### CONCLUSION

Our study confirms the continued wide variability in testing for HIP in India with respect to timing and frequency. It highlights the need for training initiatives to improve adherence to national guidelines.

Clinical Significance- Increasing adherence to and awareness of national guidelines has the potential to result in earlier diagnosis and management of HIP. This would have an impact, which would improve pregnancy outcomes, maternal and neonatal health both in the short term as well as long term. Building the capacity of the available resource pool of healthcare providers including the staff nurses would empower them by for better communication. This would improve compliance for testing and follow up.

#### KEYWORDS

Hyperglycaemia, Pregnancy, Diabetes, Teaching Institutions, Gestational Diabetes.

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#### BACKGROUND

Hyperglycaemia in Pregnancy (HIP) is a common complication during pregnancy.<sup>1</sup>

In 2015, it was estimated that 16.2% of all livebirths in the world were reported in women with a form of glucose intolerance with 85.1% being attributed to Gestational Diabetes Mellitus (GDM) and 7.4% to diabetes first detected in pregnancy.<sup>1</sup> Globally, it is expected that these percentages will increase with increases in the prevalence of obesity and Type 2 Diabetes Mellitus (T2DM), two major contributing factors to HIP.<sup>1,2</sup>

Undiagnosed and inadequately treated HIP has adverse immediate and long-term effects on maternal and infant health contributes to critical pregnancy outcomes such as preeclampsia<sup>3</sup> and increases neonatal morbidity and mortality.<sup>4</sup> Furthermore, it is associated with long-term risk

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of T2DM<sup>5,6</sup> and increases the risk of obesity and T2DM in offspring.<sup>7,8</sup> Studies have shown that GDM responds to treatment, which can improve pregnancy and infant outcomes.<sup>9,10</sup>

In South Asia, 25% of all livebirths are affected by a form of hyperglycaemia.<sup>11</sup> In India, over 4 million pregnant women have been reported to have GDM.<sup>1</sup> Furthermore, studies from high income countries have indicated that women of Indian ethnicity are at an increased risk of developing GDM.<sup>12-14</sup> Given its immediate and long-term effects on maternal and neonatal health as well as its increased incidence in women of Indian ethnicity, the testing and management of HIP among pregnant women in India is critical.

Currently, however, there are no universally accepted guidelines for the diagnosis and screening of hyperglycaemia in pregnancy. The nomenclatures of HIP, GDM and Diabetes in Pregnancy (DIP) are often used interchangeably. The diagnosis and screening criteria recommended by various organisations, including the American Diabetes Association (ADA),<sup>15</sup> The World Health Organization (WHO)<sup>16</sup> and the United Kingdom's National Institute of Health and Clinical Excellence (NICE)<sup>17</sup> lack uniformity in approach, specifically in regard to choice of screening test, universal or selective screening, a one-step or two-step screening approach and plasma glucose cut-offs. The International Federation of Gynaecology and Obstetrics (FIGO)<sup>18</sup> has renamed the terminology as Hyperglycaemia in Pregnancy (HIP) and recommends testing for HIP for all pregnant women with a country specific strategy with the available resources-Testing recommended and equally accepted for detection and further management as per DIPSI criteria in India in alignment with the Government of India (GOI) recommendations; some countries may choose testing based on the WHO (2013) criteria<sup>19</sup> or the International Association of Diabetes in Pregnancy Study Groups (IADPSG) criteria.<sup>20</sup>

In India, the Diabetes in Pregnancy Group in India (DIPSI) guidelines,<sup>21</sup> which are endorsed by FIGO, GOI, the Federation of Obstetrics and Gynaecological Societies of India (FOGSI) and the Association of Physicians of India (API) are recommended for the testing of HIP. This involves the universal screening of all pregnant women using the nonfasting one-step 75 g OGTT procedure; the plasma glucose cut-off values are based on the WHO (1999)<sup>16</sup> criteria and apply even when the screening is conducted in a nonfasting state. Adherence to these guidelines, however, depends on various factors such as awareness of recent guidelines, cost to patient and medical facility, laboratory resources, patient compliance and the availability of trained medical practitioners.<sup>22</sup>

The purpose of this study, therefore, is to determine the current practices for testing for HIP in large public hospitals attached to teaching institutions in different parts of India. It is hoped that the results of this study will inform recommendations that could strengthen the capacity building initiatives to encourage greater adherence to the

national guidelines and greater uniformity in the testing for HIP in India.

## MATERIALS AND METHODS

A nationwide survey was carried out to determine the practices in teaching institutions with regards to testing for hyperglycaemia during pregnancy in India. Forty seven teaching institutions covering the eastern, western, northern and southern parts of India were approached to participate in the study. Data collection was done via questionnaires that were handed out before a teaching programme on approved FIGO and GOI and FOGSI guidelines for HIP GDM testing and care was conducted. The questionnaires were filled out by the heads of the OB/GYN department or by lectures, professors, assistant professors or other staff members affiliated with the OB/GYN departments of the various institutions.

The questionnaire was designed to capture the following- The testing strategy for hyperglycaemia in pregnancy, i.e. universal testing or selective screening; the tests for HIP, including timing of test, procedure utilised and methods used to analyse plasma glucose in blood samples who instructed women to undergo a test and the percentage of women who were willing to follow the advice, patient compliance and whether there was a need to train doctors and nurses to improve awareness and adherence to guidelines for testing and management of HIP.

The data and information from returned questionnaires were compiled and entered into a Microsoft Excel spreadsheet and analysed.

## RESULTS

This study was carried out from June 2016 to November 2016. A total of 47 teaching institutions with obstetric departments participated in the study. Of the 45 (91.49%) respondents who entered their positions at the teaching institutions on the questionnaires, 34.88% were heads of the OB/GYN department, 16.28% were professors, 30.24% were assistant professors, 9.30% were lecturers and 9.30% were other staff members inclusive of postgraduate students. Fifteen (33.33%) of the identified institutions (95.74%) are located in northern India, 35.56% in western India, 22.22% in southern India and 8.89% in eastern India.

The majority of staff at the teaching institutions (95.83%) reported that all pregnant women were offered testing for hyperglycaemia in pregnancy and 14.5% reported that women were additionally selectively screened (Table 1). Most of the staff reported that screening for hyperglycaemia in pregnancy took place at booking (39.58%), 37.50% reported that testing took place both at booking and between 20 to 28 weeks, 12.50% reported that they tested women for hyperglycaemia once in every trimester and 10.42% reported testing women only in the mid trimester (Table 1).

Thirty three (70.21%) respondents reported using the single-step nonfasting method to diagnose hyperglycaemia, three reported using the fasting method, five reported using the two-step approach and six reported using a random

method (Table 1). Furthermore, 21.28% of respondents reported using a glucometer to determine the concentration of blood plasma, while 68.08% reported using a lab analyser. Six percent of the respondents reported that their use of either method was dependent on other factors.

87.5% respondents reported that consultants and postgraduate students advised women to undergo testing, while 6 (12.5%) reported that "staff" advised women to undergo testing (Table II). However, 65.96% of respondents felt that all women were willing to follow this advice compared to 23.40% who believed that only half of the women followed this advice (Table II).

In total, 89.35% of all respondents reported having noticed an increase in the number of women with hyperglycaemia with 51.06% reporting having noticed a significant increase, 25.53% an alarming increase and 12.77% a slight increase (Table II). Furthermore, 91% of all the respondents felt there was a need to train medical personnel and staff nurses to test and manage hyperglycaemia, while 2.13% felt there was no need. Two respondents did not respond to this question (Table II).

Parameter	Number	Percentage
Screening strategy		
Universal	46	95.83
Selective	1	2.08
Gestational age		
On booking	19	39.58
Early and midtrimester	18	37.50
Midtrimester	5	10.42
All three trimesters	6	12.50
Screening test		
Single-step nonfasting	33	70.21
Fasting	3	6.38
Two-step approach	5	10.64
Random	6	12.77
Plasma glucose		
Lab analyser	32	68.09
Glucometer	10	21.28
Depends	6	12.77

**Table 1. Testing for Gestational Hyperglycaemia in Teaching Institutions in India, 2017**

Parameter	Number	Percentage
Instructions for testing given by		
Consultants and postgraduates	41	87.2
Staff nurses	6	12.77
Patient compliance		
Readily agreed	31	65.9
Reluctantly agreed	11	23.4
Not Sure	5	10.6
Perception on prevalence after the institute initiated universal testing		
Overall		89.35
Alarming increase	11	25.53
Significant increase	24	51.06
Slight increase	6	12.77
No response	6	12.77

Felt need for capacity building		
Strong need	43	91
No need	1	2.13
No response	3	6.87

**Table 2. Perceptions; Patient Compliance and Capacity Building Need Assessments in Teaching Institutions in India, 2017**

**DISCUSSION**

Owing to the susceptibility of women of Indian ethnicity to developing hyperglycaemia in pregnancy<sup>12-14</sup> as well as the high incidence of T2DM, which has its origins from hyperglycaemia in pregnancy, in India,<sup>1</sup> the DIPSI recommends universal screening of all pregnant women for hyperglycaemia in pregnancy. In line with this recommendation, which is also in keeping with the recommendations from FIGO and FOGSI, nearly all the respondents reported that universal screening of diabetes during pregnancy was conducted at their institutions, a finding that agrees with those of similar studies that have been conducted in India.<sup>22</sup>

Although, the FIGO FOGSI DIPSI guidelines recommend screening for hyperglycaemia twice during pregnancy, i.e. on the first antenatal booking visit and 24-28 weeks' gestation if the first test is negative (DIPSI).<sup>21</sup> We found very wide variation in the timing of the test with the majority of respondents reporting that screening occurred at booking. Only 37.50% of the respondents reported that screening was conducted twice during pregnancy. Early screening of hyperglycaemia in pregnancy, for example during the first trimester is more likely to identify women who have previously undiagnosed T2DM.<sup>23</sup> However, it might miss cases of GDM as insulin resistance in women who have GDM increases with gestational age becoming more detectable in the late second to early third trimester.<sup>24</sup> Thus, there is a need to encourage medical providers to adhere to the FIGO DIPSI guidelines regarding the frequency and conditions under, which testing for HIP should be conducted.

Studies in India and other parts of the world have reported a lack of consistency in testing for HIP. This variability was reflected in our study while the majority of respondents reported that their institutions used the FIGO DIPSI guidelines, 27.89% of the respondents mentioned that other criteria such as the ADA criteria and the WHO 1999 criteria were implemented. As different criteria have different cut-offs, diabetes in pregnancy might be underdiagnosed when a variety of criteria are used. In contrast to the prevalence of 16.2% reported in recent studies after the use of new criteria, studies done in the past found that 4.8% of a study cohort of 4069 women screened positive for hyperglycaemia in pregnancy with the modified WHO 1999 criteria, whereas only 3.5% screened positive when the selective screening with modified IADPSG criteria was used.<sup>25</sup>

While various reasons might explain the variability in testing criteria in Indian hospitals, including cost-effectiveness, hospital resources and preferences of the medical personnel.<sup>19</sup> It is plausible that healthcare providers

might just not be aware of the FIGO DIPSI guidelines. This study seems to agree with this sentiment as an overwhelming majority of respondents felt there was a need to train nurses and doctors on the testing of hyperglycaemia in pregnancy. However, we also found that patient compliance and follow through when screening is advised by the healthcare providers are lacking as other studies have found<sup>21</sup> yet are equally important. Their readiness to undertake the test may have to be supported by robust counseling and logistic support. Since, the consultants and postgraduates may have time constraints, task shifting to an existing pool of human resource, such as staff nurses are is worth exploring.

Our study has two main limitations. First, the regions in India were not equally represented as the majority of respondents were affiliated with teaching institutions in northern, western and southern India and only 8.50% of the respondents were affiliated with institutions in eastern India. While acknowledging this limitation, we do not believe it undermines our findings as the respondents were members of the obstetrics and gynaecology departments of the various institutions and therefore the views they expressed reflected what had been observed in practice. Second, the questionnaires used in this study consisted of closed questions with a fixed number of responses. Although, the questions were prepared following considerable research, it is possible that owing to their structure, they might have missed trends that might have been of importance to this study.

## CONCLUSION

Our study confirms the continued wide variability in testing practices for hyperglycaemia in pregnancy in India. Furthermore, it suggests that hyperglycaemia is a big problem in India with incidence rates that appear to be significantly increasing. Therefore, there is a need to increased adherence to and awareness of the FOGSI DIPSI GOI guidelines, which are endorsed by FIGO and recommended for the testing of hyperglycaemia in pregnancy in India. This could be achieved through training initiatives that are directed at medical personnel, including nurses, who our study shows are an underutilised resource. However, our study suggests that this is not enough; strategies that encourage women to follow through with hyperglycaemia screening at the suggestion of their health care providers should be implemented as well.

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