International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Patil Y et al. Int J Reprod Contracept Obstet Gynecol. 2023 Mar;12(3):650-653
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20230532

Original Research Article

Comparison of DIPSI and IADPSG criteria for diagnosis of gestational diabetes mellitus- a prospective study in a sub-urban multi-speciality hospital

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Received: 03 January 2023
Accepted: 31 January 2023

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) refers to any degree of glucose intolerance with onset or when it is first diagnosed during pregnancy. Gestational diabetes mellitus is found to adversely affect the maternal and perinatal outcomes. The extent of the risks associated with GDM and the prevalence rate of GDM depends on the diagnostic criteria used and ethnicity of the pregnant women. Hence in order to prevent the morbidities that could result due to GDM, it is crucial to diagnose and treat during the early stages. However, confusion pertaining to the detection and diagnosis of GDM still prevails due to applicability of various threshold guidelines for its diagnosis.
Methods: The study was a prospective, single-center, randomized, controlled study conducted in the year 2021 at the department of obstetrics and gynaecology of Bhaktivedanta Hospital and Research Institute, Thane, India. The objective of the study was to evaluate the utility of IADPSG and DIPSI guidelines for screening and diagnosis of GDM at a tertiary care center.
Results: The sensitivity and specificity of DIPSI and IADPSG were compared and their readings were evaluated. The results proved that DIPSI criteria was more sensitive as compared to IADPSG criteria.
Conclusions: DIPSI is a non-fasting, fairly simple, single test method that is appropriate for low resource countries. The sensitivity of IADPSG criteria was shown to be slightly lower when compared with DIPSI criteria in the current study, despite the fact that they are universal criteria for screening and diagnosing GDM around the world. The only limitation was that it was a single center study.

Keywords: Diagnosis, DIPSI, GDM, IADPSG, Pregnancy

INTRODUCTION

Gestational diabetes mellitus (GDM) refers to any degree of glucose intolerance with onset or when it is first diagnosed during pregnancy.[1] Gestational diabetes mellitus is found to adversely affect the maternal and perinatal outcomes. History of GDM in the past pregnancy or diagnosis of GDM in the preset pregnancy can result into fetal hyperglycemia, future diabetes, premature delivery, shoulder dystocia or birth injury, hyperlipidemia, intensive neonatal care ad preeclampsia and hence screening for GDM is essential in all pregnant women.

The extent of the risks associated with GDM and the prevalence rate of GDM depends on the diagnostic criteria used and ethnicity of the pregnant women.[2] Pregnant women, in particular in Asia are at 11 fold higher risk of developing glucose intolerance and getting diagnosed as GDM positive in comparison to pregnant Caucasian women. Furthermore, GDM is more prevalent in pregnant women residing in urban areas relative to those residing in the rural area.[3,4] Hence in order to prevent the morbidities that could result due to GDM, it is crucial to diagnose and treat during the early stages. However, confusion pertaining to the detection and diagnosis of GDM still

prevails due to applicability of various threshold guidelines for its diagnosis.

International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria that is most widely used for diagnosing GDM recommends that GDM can be diagnosed if any of the values of fasting plasma glucose (FPG), 1-hour and 2-hour Plasma Glucose is equal to or above 92 mg/dl, 180 mg/dl or 153 mg/dl respectively.[5] Whereas the Diabetes in Pregnancy Study Group India (DIPSI) criteria which is similar to WHO criteria for diagnosis of GDM states that a pregnant woman is positive for GDM if the 2 hour plasma glucose after a 75 gram oral glucose load is equal to or greater than 140 mg/dl.[6] Most healthcare centers in India, prefer DIPSI for one-step screening of GDM owing to the method's simplicity ad feasibility of performing it in non-fasting state.[7] A study conducted in South-Indian women with the aim to compare the IADPSG and DIPSI criteria for GDM diagnosis found absence of significant differences between these two guidelines. The hyperglycemia and adverse pregnancy outcome (HAPO) study and the findings of study carried out by Pulkit et al suggested that higher isolated fasting glucose levels are associated with higher incidence of poor maternal and fetal outcomes.[11] In the view of the dilemma that exists regarding the applicability of IADPSG and DIPSI guidelines in resource limited Asian countries such as India where pregnant women are more prone to developing GDM, we conducted a retro-prospective study in women visiting Bhaktivedanta Hospital and Research Institute, Thane, Maharashtra to compare these two widely used criteria (IADPSG and DIPSI) to diagnose GDM.

METHODS

The study was a prospective, single-center, randomized, controlled study conducted in the year 2021 at the department of obstetrics and gynaecology of Bhaktivedanta Hospital and Research Institute, Thane, India. This study was approved by the Institutional Ethics Committee (IEC) and also has been registered with CTRI (CTRI/2021/10/037508). Total patients screened (post voluntary consent) were 163 of which 140 participants were enrolled and randomized using simple randomization. GDM test readings were noted three times as per standard practice in the Institute. First reading was taken at the fasting condition of the patient. After which, 75 gm glucose in 200 ml water was given to the patient for oral consumption and then a second reading was taken post 1 hour of glucose consumption. And a third reading was noted post 2 hours of glucose consumption. The objective of the study was to evaluate the utility of IADPSG and DIPSI guidelines for screening and diagnosis of GDM at a tertiary care center. The parameters like age, parity, weeks of gestation, BMI, were assessed and both DIPSI and IADPSG diagnostic tests were assessed. The numeric data is summarized by descriptive statistics. All statistics would be analysed by IBM SPSS software v.27.0. Statistical tests like p and t test were used. A value of $p<0.05$ were considered as statistically significant.

RESULTS

By comparing the BMI among the 28 DIPSI positive the mean was 25.42, median was 26.9 and standard deviation was 3.67. In IADPSG criteria among the 25 positives the mean was 27.55, median was 28.3 and standard deviation was 3. T-test values and p values were not significant between the two groups (Table 1).

Table 1: Comparison of BMI between positive cases of DIPSI and IADPSG criteria.

Diagnostic test	+ve	Mean	Median	SD	t-test	P value
DIPSI	28	25.42	26.9	3.67	1.0556	0.2968
IADPSG	25	27.55	28.3	3.56		

Table 2: Total number of positive and negative cases by DIPSI criteria.

DIPSI	No. of cases	Percentage
Positive	28	18.79
Negative	121	81.21
Total	149	100

Table 3: Total number of positive and negative cases by IADPSG criteria.

IADPSG	No. of cases	Percentage
Positive	25	16.77
Negative	124	83.23
Total	149	100

Table 4: Comparison of IADPSG with DIPSI criteria.

		IADPSG		Total
		Positive	**Negative**	
IADPSG	Positive	10	18	28
DIPSI	Negative	15	106	121
Total		25	124	149

Table 5: Comparison of DIPSI with IADPSG criteria.

		DIPSI		Total
		Positive	**Negative**	
DIPSI	Positive	10	15	25
IADPSG	Negative	18	106	124
Total		28	121	149

In the current study, 18.79% women were identified as GDM positive by DIPSI criteria (Table 2), while 16.77% tested positive for GDM using IADPSG criteria (Table 3). Number of both DIPSI and IADPSG positive in 10 cases, both negative in 106, DIPSI positive with IADPSG negative has 18, DIPSI negative with IADPSG positive has 15 (Table 4). Number of both IADPSG and DIPSI

positive was 10 cases, both negative were 106, IADPSG positive with DIPSI negative was 15, IADPSG negative with DIPSI positive was 18 cases (Table 5).

The sensitivity of DIPSI with IADPSG was 55.75%, specificity was 89.20%, positive predictive value 52.00% and negative predictive value 91.92%. The sensitivity of IADPSG with DIPSI was 42.00%, specificity was 92.96%, positive predictive value is 48.53% and negative predictive value was 88.60% when compared to DIPSI (Table 7). Therefore, by comparing Tables 6 and 7, DIPSI has got higher sensitivity and was found comparatively better than IADPSG in diagnosing GDM.

Table 6: Statistical parameters of DIPSI with IADPSG criteria.

Statistical parameters	Value	95% CI
Sensitivity	55.75%	26.39-72.44%
Specificity	89.20%	81.33-94%
Positive likelihood ratio	4.60	1.56-8.19
Negative likelihood ratio	0.87	0.47-0.96
Disease prevalence	16.22%	10.56-23.26%
Positive predictive value	39.00%	27.55-58.40%
Negative predictive value	85.90%	80.72-90.62%

Table 7: Statistical parameters of IADPSG with DIPSI criteria.

Statistical parameters	Value	95% CI
Sensitivity	42.00%	22.17-64.45%
Specificity	92.96%	85.25-93.55%
Positive likelihood ratio	3.97	2.1-9.17
Negative likelihood ratio	0.65	0.52-0.94
Disease prevalence	16.66%	10.51-26.52%
Positive predictive value	48.53%	28.86-63.13%
Negative predictive value	88.60%	83.74-90.81%

DISCUSSION

Gestational diabetes mellitus continues to remain a major public health concern due to its association with adverse maternal and fetal outcomes such as fetal hyperglycemia, future diabetes, premature delivery, intensive neonatal care, hyperbilirubinemia, preeclampsia, shoulder dystocia, or birth injury. The extent of the occurrence of associated risks and the incidence rate of GDM depends on the type of the diagnostic criteria used and the ethnicity of the pregnant women undergoing screening test for GDM.[8] Screening for GDM in Indian pregnant women is essential since this particular population is prone to developing GDM in comparison to pregnant women belonging to other ethnic groups. However, lack of uniformity prevails regarding the type of diagnostic and screening method used for detecting GDM. DIPSI, a non-fasting test that is simple, easier to perform and cost-effective, is widely used for GDM screening in the Indian context. Based on the findings of HAPO study, the IADPSG consensus panel recommends use of IADPSG criteria for diagnosing GDM since, relative to other diagnostic criteria, it is more sensitive, specific, precise and accurate.[9] The present study was conducted in women between 32-38 weeks of pregnancy visiting Bhaktivedanta Hospital and Research Institute for screening of GDM.

In our study, we found that the epidemiological parameters such as parity, family history of diabetes mellitus, history of PCOS and history of twins did not have any significant difference in both groups. These results were in agreement studies done by Mohan et al, Geetha et al, and Pulkit et al.[7,10,11] These findings corroborate the findings presented by Pulkit et al in their study.[11] Srinivasan et al in their study found prevalence of GDM using DIPSI and IADPSG criteria to be 17.4% and 15.3% respectively.[12] By using IADPSG criteria and applying, FPG ≥92 mg/dl, 65 out of a population of 119 (54.63%) were diagnosed with GDM, whereas by applying 1-h PG ≥180 mg/dl and 2-hour PG ≥153 mg/dl, 29 of 119 (24.37%) and 25 of 119 (21%) respectively were identified with GDM. By using IADPSG criteria, Pulkit et al in their study found 22.36% women had FPG ≥92 mg/dl while 45.39 % had 2-hour PG ≥153 mg/dl.[11] However, our study results showed that there is an association between the age of the pregnant women at the time of screening, BMI and GDM diagnosis. 69.44% above the age of 30 years had 2-hour plasma glucose level ≥140 mg/dl. Similarly, 68.96% and 60% of women above the age of 30 years had 1-hour plasma glucose level and non-fasting glucose level ≥180 mg/dl and ≥92 mg/dl respectively. In a prospective study of 100 women Geetha et al found prevalence rates of GDM to be 14% and 9% with DIPSI and IADPSG criteria respectively. In the same study they found that 4% were diagnosed by both criteria and 5% were left undiagnosed by IADPSG criteria which could have been easily detected by DIPSI.[10] Geetha et al based on their study results concluded DIPSI criteria to be better than IADPSG due to its feasibility and absence of any significant differences in terms of diagnosing GDM between these two criteria.[10] On the contrary, in their retrospective study of 152 women conducted to compare DIPSI and IADPSG criteria and also evaluate isolated fasting glucose in GDM diagnosis, Pulkit et al found IADPSG to be better than DIPSI since 23.36% pregnant women who were left undiagnosed by DIPSI were easily detected by IADPSG criteria. Furthermore, from their results, the prevalence rate of GDM was computed to be 74.34% by DIPSI and 88.15% by IADPSG. Pulkit et al also concluded that higher fasting glucose rates which could be used to detect GDM were possibly because of prevalence of high-risk factors in their subjects of study like advanced age, BMI, family history etc.[11] Similarly, Bhavadharini et al based on women in India with GDM strategy (WINGS) project found that DIPSI has very low sensitivity of 22.6% and specificity of 97.8% whereas IADPSG criteria has sensitivity of 27.7% and specificity of 97.7%.[13] They believe that non-fasting state was the reason behind lower sensitivity of DIPSI and hence from their results, they concluded that the international guidelines where test should be done after overnight fast should be adopted for GDM diagnosis instead of DIPSI.[13]

CONCLUSION

DIPSI is a non-fasting, fairly simple, single test method that is appropriate for low resource countries. The sensitivity of IADPSG criteria was shown to be slightly lower when compared with DIPSI criteria in the current study, despite the fact that they are universal criteria for screening and diagnosing GDM around the world. The only limitation was that it was a single center study.

ACKNOWLEDGMENTS

We are highly grateful to Mr. Aryan Kadam who contributed in analysing the data and in drafting the manuscript.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee also has been registered with CTRI (CTRI/2021/10/037508)

REFERENCES

1. Metzger BE, Cho NH, Roston SM, Radvany R. Prepregnancy weight and antepartum insulin secretion predict glucose tolerance five years after gestational diabetes mellitus. Diabetes Care. 1993;16(12):1598-605.
2. Federation ID. IDF diabetes atlas. Brussels: International Diabetes Federation. 2013;128:40-50.
3. Madsen JK, Haunsøe S, Helquist S, Hommel E, Malthe I, Pedersen NT, et al. Prevalence of hyperglycaemia and undiagnosed diabetes mellitus in patients with acute myocardial infarction. Acta Med Scand. 1986;220(4):329-32.
4. Zargar AH, Sheikh MI, Bashir MI, Masoodi SR, Laway BA, Wani AI, et al. Prevalence of gestational diabetes mellitus in Kashmiri women from the Indian subcontinent. Diabetes Res Clin Pract. 2004;66(2):139-45.
5. International Association of Diabetes and Pregnancy Study Groups Consensus Panel. International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. Diabetes care. 2010;33(3):676-82.
6. American Diabetes Association. Standards of medical care in diabetes- 2011. Diabetes Care. 2011;34(1):S15.
7. Mohan V, Mahalakshmi MM, Bhavadharini B, Maheshwari K, Kaliyarasi G, Anjana RM, et al. Comparison of screening for gestational diabetes mellitus by oral glucose tolerance tests done in the non-fasting (random) and fasting states. Acta Diabetol. 2014;51:1007-13.
8. Seshiah V, Das AK, Balaji V, Joshi SR, Parikh M, Gupta S. Gestational diabetes mellitus-guidelines. JAPI. 2006;54(622).
9. Metzger BE, Contreras M, Sacks DA, Watson W, Dooley SL, Foderaro M, et al. Hyperglycemia and adverse pregnancy outcomes. N Engl J Med. 2008;358(19):1991-2002.
10. Geetha N, Sangeetha KG. Comparison of IADPSG and DIPSI criteria for diagnosis of gestational diabetes mellitus. IOSR J Dent Med Sci. 2016;15:1-4.
11. Vij P, Jha S, Gupta SK, Aneja A, Mathur R, Waghdhare S, Panda M. Comparison of DIPSI and IADPSG criteria for diagnosis of GDM: a study in a north Indian tertiary care center. Int J Diabetes Develop Countries. 2015;35(3):285-8.
12. Srinivasan S, Reddi RP. Comparative study of DIPSI and IADPSG criteria for diagnosis of GDM. Int J Reprod Contracept Obstet Gynecol. 2018;7(3):933.
13. Bhavadharini B, Uma R, Saravanan P, Mohan V. Screening and diagnosis of gestational diabetes mellitus- relevance to low and middle income countries. Clin Diabetes Endocrino. 2016;2(1):1-8.

Cite this article as: Patil Y, Thiyagarajan K, Chaudhari V, Shah K, Vijay R. Comparison of DIPSI and IADPSG criteria for diagnosis of gestational diabetes mellitus- a prospective study in a sub-urban multi-speciality hospital. Int J Reprod Contracept Obstet Gynecol 2023;12:650-3.