

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20231594>

Review Article

Exploring the effectiveness of various screening criteria used in gestational diabetes mellitus

S. Keerthana, Usha Devi Gopalan*

Department of Obstetrics and Gynaecology, SSSMCRI, Chennai, Tamil Nadu, India

Received: 30 March 2023

Accepted: 29 April 2023

***Correspondence:**

Dr. Usha Devi Gopalan,

E-mail: Ushag7@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Hyperglycemia during pregnancy leads to fatal maternal and perinatal outcomes. Gestational diabetes mellitus (GDM) is diagnosed by 75 grams oral glucose tolerance test at 24-28 weeks of gestational age as insulin resistance increases during the second trimester. Increased prevalence of diabetes mellitus, sedentary lifestyle, Family history of DM predisposes women, particularly the Indian women to develop GDM. Existence of multiple criteria like IADPSG (International association of diabetes and pregnancy study groups), WHO (World health organisation), ADA (The American diabetes association criteria, DIPSI (Diabetes in pregnancy study groups criteria) creates serious confusion in screening of GDM. Therefore, there is a need to find a effective single screening criteria.

Keywords: Criteria, GDM, Screening, WHO, IADPSG

INTRODUCTION

The intolerance to carbohydrates of any grade identified first time during pregnancy is called GDM.¹ The prevalence of GDM varies from 3.8 to 21% in different parts of India based on the various screening criteria that are used.² There are various high risk factors for the causation of GDM like advanced age, past obstetric history of GDM, past history of birth of infant with birthweight >4 kgs, increased amniotic fluid and unexplained foetal death.³⁻⁶ There are various screening methods available for screening of GDM like WHO criteria, IADPSG criteria, DIPSI, ADA.

There are various adverse maternal and fetal outcomes in GDM like increased instrumental delivery, shoulder dystocia, Erb's Palsy and neonatal hypoglycaemia, therefore finding a single effective screening method plays an important role. The purpose of the review is to find the effectiveness of the various criteria in the screening of GDM.

REVIEW OF LITERATURE

Wendland et al did a systematic review of the diagnostic criteria of WHO and the IADPSG for the diagnosis of Gestational diabetes and outcomes of pregnancy. They did not find any significant difference between the two criteria.⁷

Nallaperumal et al compared the criteria from WHO and the IADPSG groups for the diagnosis of GDM among 1351 South Indians, who underwent screening for GDM at four selected diabetes centres from Chennai (three private and one government). They observed that IADPSG criteria identified 699/839 (83.3%) of the total number of women diagnosed as GDM and 98.2% of the women with GDM in the study population were identified by the WHO criteria. WHO criteria being a two cut-off point criteria (Fasting > 126 mg/dl and 2 hours > 140 mg/dl) seems to be appropriate for large-scale screening for GD in countries like India and other developing countries.⁸

Seshiah et al used DIPSI criteria for the identification of GDM in the community using the single 2-h Plasma glucose (PG) greater than or equal to 140 mg/dL with 75 gm oral glucose load to diagnose GDM.⁹ They compared DIPSI criteria and IADPSG criteria for diagnosis of GDM among 1463 women. They observed that the prevalence of GDM was 14.6% (n=214) by IADPSG criteria which was not significantly different when compared to 13.4% (n=196) by DIPSI criteria. They further recommended that DIPSI procedure is a single test process, with cost-effectiveness, without negotiating the clinical equilibrium and it can be used in countries with limited resource settings like India.

Mohan et al compared the screening of GDM by 75-g oral glucose tolerance tests (OGTT) done in the non-fasting (random) and fasting states (such as DIPSI criteria, WHO criteria and IADPSG criteria) for GDM.¹⁰ They included 1,031 pregnant women attending antenatal clinics from urban and rural areas of Tamil Nadu. Of the 83 women, diagnosed with gestational diabetes by WHO criteria, only 23 were diagnosed by DIPSI criteria (sensitivity 27.7 %, and specificity 97.7%). Among the 106 women, identified to have gestational diabetes by the IADPSG criteria, only 24 were identified by DIPSI (sensitivity 22.6%, and specificity 97.8%). They concluded that DIPSI non-fasting OGTT criteria (2-hour) due to its low sensitivity cannot be suggested for diagnosis of GDM.

Nayak et al compared the two different criteria from WHO and the IADPSG for the precise diagnosis of GDM among 304 South Indians from PIMS, Pondicherry.¹¹ They observed that the prevalence of GDM was 83/304 (27.3%) by the IADPSG and 27/304 (8.8%) by WHO criteria. This implies that nearly 70% of the cases were missed by WHO criteria in diagnosing GDM.

Vij et al did a comparative study of DIPSI criteria and IADPSG criteria for diagnosis of GD in a North Indian tertiary care centre.¹² They conducted this retrospective study among 152 consecutive pregnant women in Max Super Speciality hospital, Saket, Delhi. They observed that in their study population, diagnosis of GDM by DIPSI criteria missed 22.36% of GDM patients. Since a considerable amount of the patients are missed, they suggested that IADPSG criteria are better compared with DIPSI criteria for screening of GDM in India.

Dias et al compared the different diagnostic guidelines (IADPSG, WHO and Sri Lankan national guidelines) for GDM in relationship to birth weight in Sri Lankan Women.¹³ They included 795 singleton pregnancies from two tertiary hospitals in Sri Lanka. They concluded that from their results, that IADPSG criteria is superior over WHO and Sri Lankan national guidelines among their study population.

Baskaran et al did a comparative study to study ADA criteria and WHO criteria for screening of GDM among 200 antenatal patients of government Mohan

Kumaramangalam medical college, Salem. They observed that 28 patients were diagnosed to have gestational diabetes by applying ADA criteria whereas 26 patients by applying WHO criteria. They did not find any significant difference between the ADA criteria and WHO criteria for screening of GDM.

Bhavadharini et al did the Women in India with GDM Strategy (WINGS) project, and studied the relevance of screening and confirmation of the diagnosis of GDM from countries of low- and middle-income region, and they observed that the IADPSG criteria appears to be the uniform criteria for screening and the best one too in terms of the study validity.¹⁵

Duran et al did the St. Carlos GD study, in a Large Cohort of pregnant women.¹⁶ They observed that the 3.5-fold increase in GDM prevalence by introducing the new IADPSG criteria for the screening of GDM and its Diagnosis caused improvement in pregnancy outcomes at a lower cost.

Benhalima et al did a retrospective analysis of 6727 pregnancies. They observed that the usage of IADPSG criteria, identified more prevalence of GDM, and increased risk for adverse gestational outcomes compared with that of women without GDM.¹⁷

Todi et al prospective observational study in Pondicherry and compared the IADPSG criteria with the NICE in diagnosis of GDM. They observed that the usage of IADPSG criteria, identified more prevalence of GDM, and increased risk for adverse gestational outcomes compared with that of NICE criteria.¹⁸

Sagili et al conducted diagnostic accuracy study in Pondicherry.¹⁹ They compared IADPSG criteria with WHO criteria in diagnosis of GDM. Observed prevalence of GDM, by using IADPSG criteria and WHO criteria as 12.6 and 12.4% respectively. They recommended that a revised WHO criterion applying a 2 h threshold of ≥ 140 mg% can be easy to perform and economic.

Reddi et al in their review study, discussed about various criteria to screen and diagnose GDM and insisted that the usage of IADPSG criteria is the only outcome-based criteria, and hence its application can help in preventing the adverse maternal and foetal outcomes.²⁰

Shang et al they observed that the 2-fold increase in GDM prevalence by introducing the new IADPSG criteria for the screening of GDM and its diagnosis caused an improvement in pregnancy and natal outcomes.²¹

Weinert et al did a study on 4,977 women from the cohort of the Brazilian GD study.²² They compared the IADPSG criteria, with ADA and WHO criteria and observed no significant differences. They observed that the IADPSG criteria identified a higher frequency of GDM especially among the lower-risk pregnancies.

Chi et al studied the WHO criteria 2013 (without the 1-hour glycaemia measurement) for the screening and diagnosis of GDM.²³ They observed that the WHO criteria identified a lower frequency of GDM and failed to identify the adverse pregnancy and foetal outcomes.

Gopalakrishnan et al did a cross-sectional study among 332 pregnant women from Lucknow.²⁴ They observed a high prevalence (41.9%) of GDM using IADPSG criteria. They observed birth weight was similar among the groups with and without GDM.

Wendland et al did a systematic review and compared the IADPSG criteria with WHO criteria in diagnosis of GDM.²⁵ They observed that the WHO criteria and IADPSG criteria similarly identified the adverse pregnancy and foetal outcomes. IADPSG criteria had high inconsistency in identifying the adverse pregnancy and foetal outcomes.

Balagopalan et al from Noida, did a community-based study among 506 pregnant women through a house-to-house survey. The prevalence of GDM was found to be much greater by IADPSG criteria as compared with the WHO criteria and DIPSI criteria. They suggested that as DIPSI criteria was a single-step approach, it can be used as a screening tool, especially in the resource limited primary care settings.²⁶

CONCLUSION

Based on the current review the sensitivity of the IADPSG criteria is high as it diagnosed more GDM cases when compared to the other screening criteria and therefore with effective and early treatment the adverse outcomes of GDM can be reduced.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Mahalakshmi MM, Bhavadharini B, Kumar M, Anjana RM, Shah SS, Bridgette A et al. Clinical profile, outcomes, and progression to type 2 diabetes among Indian women with gestational diabetes mellitus seen at a diabetes center in south India. *Indian J Endocrinol Metab.* 2014;18(3):400-6.
- 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;66:139-45.
- Lee KW, Ching SM, Ramachandran V, Yee A, Hoo FK, Chia YC et al. Prevalence and risk factors of gestational diabetes mellitus in Asia: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2018;18(1):1-20.
- Teh WT, Teede HJ, Paul E, Harrison CL, Wallace EM, Allan C. Risk factors for gestation diabetes mellitus: implications for the application of screening guidelines. *Aust New Zeal J Obstet Gynaecol.* 2011;51(1):26-30.
- Di Cianni G, Volpe L, Lencioni C, Miccoli R, Cuccuru I, Ghio A et al. Prevalence and risk factors for gestational diabetes assessed by universal screening. *Diabetes Res Clin Pract.* 2003;62(2):131-7.
- Cypryk K, Szymczak W, Czupryniak L, Sobczak M, Lewiński A. Gestational diabetes mellitus-an analysis of risk factors. *Endokrynol Pol.* 2008;59(5):393-7.
- Wendland EM, Torloni MR, Falavigna M, Trujillo J, Dode MA, Campos MA et al. Gestational diabetes and pregnancy outcomes-a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria. *BMC Pregnancy Childbirth.* 2012;12(1):23-9.
- Nallaperumal S, Bhavadharini B, Mahalakshmi MM, Maheswari K, Jalaja R, Moses A et al. Comparison of the world health organization and the international association of diabetes and pregnancy study groups criteria in diagnosing gestational diabetes mellitus in South Indians. *Indian J Endocrinol Metab.* 2013;17(5):906-9.
- Seshiah V, Balaji V, Shah SN, Joshi S, Das AK, Sahay BK et al. Diagnosis of gestational diabetes mellitus in the community. *J Assoc Physicians India.* 2012;60:15-7.
- Mohan V, Mahalakshmi MM, Bhavadharini B, Maheswari K, Kalaiyarasi 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(6):1007-13.
- Nayak PK, Mitra S, Sahoo JP, Daniel M, Mathew A, Padma A. Feto-maternal outcomes in women with and without gestational diabetes mellitus according to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) diagnostic criteria. *Diabetes Metab Syndr.* 2013;7(4):206-9.
- Vij P, Jha S, Gupta SK, Aneja A, Mathur R, Waghdhare S et al. Comparison of DIPSI and IADPSG criteria for diagnosis of GDM: a study in a north Indian tertiary care center. *Int J Diabetes Dev Ctries.* 2015;35(3):285-8.
- Dias T, Siraj SHM, Aris IM, Li L-J, Tan KH. Comparing Different Diagnostic Guidelines for Gestational Diabetes Mellitus in Relation to Birthweight in Sri Lankan Women. *Front Endocrinol (Lausanne).* 2018;9:682-91.
- Baskaran J, Sengodan SS, Pandian A. A comparative study of ADA and WHO criteria for screening of gestational diabetes mellitus. *Int J Reprod Contraception, Obstet Gynecol.* 2018;7(3):957-66.
- Bhavadharini B, Uma R, Saravanan P, Mohan V. Screening and diagnosis of gestational diabetes mellitus- relevance to low and middle income countries. *Clin Diabetes Endocrinol.* 2016;2(1):13-12.
- Duran A, Sáenz S, Torrejón MJ, Bordiú E, del Valle

- L, Galindo M et al. Introduction of IADPSG Criteria for the Screening and Diagnosis of Gestational Diabetes Mellitus Results in Improved Pregnancy Outcomes at a Lower Cost in a Large Cohort of Pregnant Women: The St. Carlos Gestational Diabetes Study. *Diabetes Care.* 2014;37(9):2442-50.
17. Benhalima K, Hanssens M, Devlieger R, Verhaeghe J, Mathieu C. Analysis of Pregnancy Outcomes Using the New IADPSG Recommendation Compared with the Carpenter and Coustan Criteria in an Area with a Low Prevalence of Gestational Diabetes. Agarwal AK, editor. *Int J Endocrinol.* 2013;2013:248121.
 18. Todi S, Sagili H, Kamalanathan SK. Comparison of criteria of International Association of Diabetes and Pregnancy Study Groups (IADPSG) with National Institute for Health and Care Excellence (NICE) for diagnosis of gestational diabetes mellitus. *Arch Gynecol Obstet.* 2020;302(1):47-52.
 19. Sagili 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;19(6):824-8.
 20. Reddi RP, Begum J. Screening and diagnosis of gestational diabetes mellitus, where do we stand. *J Clin Diagnostic Res.* 2016;10:QE01-4.
 21. Shang M, Lin L. IADPSG criteria for diagnosing gestational diabetes mellitus and predicting adverse pregnancy outcomes. *J Perinatol.* 2014;34(2):100-4.
 22. Weinert LS. International Association of Diabetes and Pregnancy Study Groups Recommendations on the Diagnosis and Classification of Hyperglycemia in Pregnancy. *Diabetes Care.* 2010;33(7):e97 LP.
 23. Chi C, Loy SL, Chan S-Y, Choong C, Cai S, Soh SE et al. Impact of adopting the 2013 World Health Organization criteria for diagnosis of gestational diabetes in a multi-ethnic Asian cohort: a prospective study. *BMC Pregnancy Childbirth.* 2018;18(1):69.
 24. Gopalakrishnan V, Singh R, Pradeep Y, Kapoor D, Rani A, Pradhan S et al. Evaluation of the prevalence of gestational diabetes mellitus in North Indians using the International Association of Diabetes and Pregnancy Study groups (IADPSG) criteria. *J Postgrad Med.* 2015;61(3):155-8.
 25. Wendland EM, Torloni MR, Falavigna M, Trujillo J, Dode MA, Campos MA et al. Gestational diabetes and pregnancy outcomes-a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria. *BMC Pregnancy Childbirth.* 2012;12(1):23-9.
 26. Balagopalan N, Pathak R, Islam F, Nigam A, Kapur P, Agarwal S. Diagnostic accuracy of Diabetes in Pregnancy Study Group of India criteria for the screening of gestational diabetes mellitus in primary care setting. *Indian J Community Fam Med.* 2021;7(1):25-30.

Cite this article as: Keerthana S, Gopalan UG. Exploring the effectiveness of various screening criteria used in gestational diabetes mellitus. *Int J Reprod Contracept Obstet Gynecol* 2023;12:1956-9.