



MANAGEMENT OF GESTATIONAL DIABETES MELLITUS: AN INSIGHT INTO EVIDENCE-BASED PRACTICE AMONG POSTGRADUATE TRAINEES OF OBSTETRICS AND MEDICINE DISCIPLINES

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ABSTRACT

OBJECTIVE: To explore the discrepancies regarding screening, diagnosis & management of gestational diabetes mellitus (GDM) among postgraduate trainees of Obstetrics & Gynaecology (OBG) and Medicine disciplines.

METHODS: This multicentre cross-sectional study was conducted from 1st to 31st August 2022. The questionnaire regarding screening, diagnosis, management of GDM, & postnatal follow-up with neonatal care were distributed among postgraduate trainees of medicine/OBG through google-form/hardcopies. Data was analysed through SPSS-22.

RESULTS: Out of 236 trainees, 184 (78%) were following national institute of clinical excellence (NICE) guidelines for management of GDM. Majority of medicine (n=87/120 (72.5%) & OBG (n=76/116; 65.5%) trainees failed to identify the correct cut-off of oral glucose tolerance test for GDM. A big chunk of both OBG (n=93/116; 80.2%) and Medicine (n=96/120; 80%) trainees were unable to differentiate pre-existing diabetes mellitus from GDM. The clinical knowledge about carbohydrate diet (n=119/236; 50.4%), calories intake (103/236; 43.6%) and low glycaemic index (138/236; 58.5%) was poor among trainees of both specialities. Surprisingly, the medicine trainee's knowledge about insulin types, dose & tocolytic agent was not evidence-based. The practicing knowledge of both specialities was poor about identification of neonatal hypoglycemia (n=30/236; 12.7%) and its management (n=47; 19.9%). Trainees of both specialities had poor knowledge about postnatal follow-up (n=64/236; 27.1%) of GDM patients.

CONCLUSION: GDM is a common domain for OBG and medicine disciplines with no consensus guidelines for its uniform management. This study has identified some basic gaps in the clinical practice of future consultants regarding GDM management, urging the need of combined local guidelines.

KEYWORDS: Pregnancy in Diabetics (MeSH); Guideline (MeSH); Practice Guidelines (MeSH); Evidence-Based Practice (MeSH); Diabetes, Gestational (MeSH); Pakistan (MeSH); Khyber Pakhtunkhwa (Non-MeSH); Postgraduate Trainees (Non-MeSH); Obstetrics and Gynecology Department, Hospital (MeSH).

THIS ARTICLE MAY BE CITED AS: Gul F, Bibi R, Shamsheer S, Bawar S, Karim R. Management of gestational diabetes mellitus: an insight into evidence-based practice among postgraduate trainees of obstetrics and medicine disciplines. *Khyber Med Univ J* 2023;15(1):20-25 <https://doi.org/10.35845/kmu.2023.23126>

INTRODUCTION

Diabetes mellitus (DM) is one of the most challenging public health issues of 21st century, especially for low and middle-income countries.¹ Globally the diabetic population is increasing at rate of 8.6 million/year & 21.3 million live births are

affected by some form of hyperglycaemia in pregnancy affected by some form of hyperglycaemia in pregnancy.² With the prevalence rate of 26.3%,³ Pakistan has been ranked 10th among 221 countries across the globe regarding the burden of DM.² The global prevalence of Gestational Diabetes Mellitus (GDM) is almost 15%.⁴ With

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Date Submitted: September 23, 2022

Date Revised: December 12, 2022

Date Accepted: January 05, 2023

significantly high frequency in the South Asian region, the frequency of GDM reported in Pakistan is 19%.⁵

The GDM is associated with a large number of maternal, fetal and neonatal morbidity as well as mortality & increased risk of developing Type 2 Diabetes Mellitus (T2DM) later in life.⁶ The various adverse maternal complications include hypertension, preeclampsia, urinary tract infection, hydramnios, increased operative intervention and future DM. In the fetus and neonates it is associated with macrosomia, congenital anomalies, metabolic abnormalities, respiratory distress syndrome and subsequent childhood and adolescent obesity & its related complications.³

GDM cannot be taken on as a single clinical entity, rather it is a trans-generational disease. Women with GDM is becoming an ideal group for primary prevention of DM, who can be benefited by early non-therapeutic intervention with diet and exercise to delay or even possibly to prevent the onset of T2DM.⁷

GDM is a topic of controversy when it comes to its screening, diagnosis and its management. Precise level of glucose intolerance characterizing GDM remained controversial over decades.

Unfortunately, there is no international consensus on the screening and diagnostic criteria for GDM. Various existing diagnostic criteria's and guidelines are country specific.⁸⁻¹⁰ There is a lack of agreed screening tests and criteria for diagnosis and management of GDM and health care providers are not abreast with the latest evidence-based national and international recommendations.

This study was planned to explore the discrepancies among obstetrics & gynaecology (OBG) and medicine trainees regarding screening, diagnosis & management of GDM. Undergraduate trainees and residents are the future community healthcare workers. Efforts to understand the gaps in their knowledge and practice and strategies to overcome these gaps may have far-reaching implications in management of GDM.

METHODS

This multi-centred, cross-sectional study was conducted in collaboration with Postgraduate Medical Institute (PGMI) Peshawar, Pakistan. The questionnaire regarding screening, diagnosis, management of GDM and postnatal follow-up with neonatal care were shared both with postgraduate (PG) trainees of medicine/OBG and their respective supervisors as google form/ hardcopies through PGMI.

Inclusion Criteria:

- PG trainees who have cleared intermediate module (IMM) of fellowship training of College of Physicians & Surgeons of Pakistan in their respective speciality.

Exclusion criteria

- PG trainees who refused to participate in the study.

The sample size was calculated by taking a population (Medicine + OBG trainee Medical Officers in Khyber Pakhtunkhwa) size (N) = 570, and in the absence of published figures, taking the hypothesized frequency of outcome factor (practicing of one out of the three types of guidelines) in the population (p) = 33% ± 5, using an absolute precision (d) = 5%, and a design effect (DEFF) =

1, we calculated a sample of 214 participants using the formula: Sample size $n = \frac{[DEFF * N * p] / [(d^2 / Z^2) * (1 - p)]}{1}$ accounting for a 10% potential non-response we rounded-off the sample size to 235.

Proforma was based on questions related to screening, diagnosis and management of GDM along with postnatal and neonatal care as per latest guidelines including National Institute for Health and Care Excellence (NICE) guidelines,¹¹ American Diabetes Association (ADA) guidelines,¹² Management of Diabetes in Pregnancy guidelines (IADPSG),¹³ Society of Obstetrics & Gynaecology of Pakistan (SOGP) guidelines¹⁴ and standard text books of OBG/Medicine.

The first portion of questionnaire had five questions about the guidelines currently used in their respective speciality and screening criteria of gestational diabetes. The second portion was about management of diabetes during pregnancy. It has seven questions regarding various management categories like exercise and diet criteria, oral hypoglycaemic criteria, insulin therapy criteria. Monitoring frequency of blood sugar levels & management during labour & postnatal screening. A pre-test of the questionnaires was carried out on twenty trainees who were not study participants and corrections were made accordingly.

Data was analysed using SPSS 23 and frequencies and percentages were calculated.

RESULTS

Out of 236 study participants, 177 (75%) were females and 55 (25%) were males. The mean age of study participants was 28.8 ± 1.57 years. Majority of study participants (n=184/236; 78%) were reading NICE guidelines followed by standard textbooks (n=31/236; 13.1%) for management of GDM (Table I).

Overall, fasting blood sugar (FBS) and random blood sugar (RBS) were correctly identified by 226 (95.8%) and 216 (91.5%) trainees respectively. Screening time was correctly identified

by OBG trainees (n= 85; 73.3%) as compared to medicine trainees (n=61, 50.8%). Though the correct screening test (OGTT) was identified by 106 (88.3%) medicine trainees and 102 (87.9%) OBG trainees, the cut off for diagnosis of GDM was wrongly answered by 87 (72.5%) medicine trainees and 76 (65.5%) OBG trainees. A big chunk of both OBG (n=93; 80.2%) and medicine (n=96; 80%) trainees were unable to differentiate pre-existing diabetes from GDM (Table II).

The clinical knowledge about carbohydrate diet (n=119/236; 50.4%), calories intake (103/236; 43.6%) & low glycaemic index (138/236; 58.5%) was poor among both specialities. Surprisingly the medicine trainee's knowledge about insulin types, dose & tocolytic agent was not evidence-based (Table III).

The practicing knowledge of both specialities was poor about identification of neonatal hypoglycemia (n=30/236; 12.7%) and its management (n=47; 19.9%). Similarly, the trainees of both specialities had poor knowledge about postnatal follow-up (n=64; 27.1%) of GDM patients (Table IV).

DISCUSSION

This study identified that the trainees had reasonable knowledge about DM in pregnancy and its management, but were lacking in knowledge about the differentiation of GDM and pre-existing DM. Trainees also had a weak knowledge about postnatal and long term follow up and its importance to women's health. Identifying correct FBS values and timing of screening for GDM was excellent in the OBG group and even to a greater extent in the medicine group. Categorising them for treatment with oral hypoglycaemic agents or insulin and management during labour was also satisfactory. The medicine trainees had better knowledge of FBS values and diabetic diet and caloric intake as compared to OBG trainees.

In our study, only 8.6% of OBG trainees and none of medicine trainee were following comprehensive local guidelines on management of GDM, by

TABLE I: BASELINE CHARACTERISTICS OF STUDY PARTICIPANTS

Variables		OBG Trainees (n=116)	Medicine Trainees (n=120)	Total (n=236)	P value
Gender	Male	0	59 (49.2%)	59 (25%)	0.000
	Female	116 (100%)	61 (50.8%)	177 (75%)	0.000
Training year	3rd year	57 (50.8%)	85 (70.8%)	142 (60.2%)	0.001
	4th year	59 (49.1%)	35 (29.2%)	94 (39.8%)	0.001
Family history of diabetes	Yes	80 (54.2%)	65 (69%)	145 (61.4%)	0.02
Practicing guidelines	NICE guidelines	81 (69.8%)	103 (85.8%)	184 (78%)	0.000
	SOGP Guidelines	10 (8.6%)	0	10 (4.2%)	
	ADA guidelines	0	7 (5.8%)	7 (3%)	
	IADPSG	1(0.9%)	1 (0.9%)	2 (0.9%)	
	Standard text book of OBG/Medicine	23(19.8%)	8 (6.6%)	31 (13.1%)	
	None of the above	1(0.9%)	1 (0.9%)	2 (0.8%)	

NICE: National Institute for Health and care Excellence; ADA: American Diabetes Association; SOGP: Society of Obstetricians & Gynecologists of Pakistan; IADPSG: International Association of the Diabetes and Pregnancy Study Groups; OBG: Obstetrics & Gynecology

TABLE II: SCREENING AND DIAGNOSIS OF GESTATIONAL DIABETES MELLITUS

Variable	OBG Trainees (n=116)	Medicine Trainees (n=120)	Total (n=236)	P value
Correctly diagnosed fasting blood glucose	106 (91.4%)	120 (100%)	226 (95.8%)	<.001
Correctly diagnosed random blood glucose	101 (87.1%)	115 (95.8%)	216 (91.5%)	.036
Correctly diagnosed HbA1c	108 (93.1%)	118 (98.3%)	226 (95.8%)	.125
Correct screening group of GDM identified	53 (45.7%)	42 (35%)	95 (40.3%)	.09
Correct screening time of GDM identified	85 (73.3%)	61 (50.8%)	146 (61.9%)	<.001
Correctly identified Best screening test (OGTT) for GDM	102 (88.3%)	106 (87.9%)	208 (88.1%)	.53
Correctly identified OGTT cut-off	39 (33.6%)	30 (25%)	69 (29.2%)	.119
Correct diagnosis of Pre-existing diabetes Mellitus	23 (19.8%)	24 (20%)	47 (19.9%)	.614

HbA1c: Hemoglobin A1c (Glycosylated Haemoglobin); GDM: Gestational Diabetes Mellitus; OGTT: Oral Glucose Tolerance Test, OBG: Obstetrics & Gynecology

Society of Obstetricians and Gynaecologists of Pakistan.¹⁴ Majority of our trainees were following NICE guidelines, which are UK specific. Same discrepancy in using various guidelines on GDM management was observed in an Indian study.¹⁵ Similar preferences for international guidelines over local guidelines have been observed in a study conducted in Bangladesh.¹⁶ Establishing uniformity in guidelines and reducing knowledge gaps in terms of healthcare providers is essential for improving GDM detection and management.¹⁷

Inconsistencies in the GDM diagnostic strategy between different guidelines have led to challenges in making clinical diagnosis. The discrepancies in criteria of screening, timing of screening and OGTT cut-off values among various guidelines^{14,18} and text books led to inconsistencies in screening and diagnosis of GDM by trainees of both specialities. Similar lack of evidence-based practice has been reported in another study done in Pakistan.¹⁹

The most astonishing finding of our study was that our post-IMM trainees of both specialities were unable to differentiate pre-diabetes from GDM. Though the correct screening test (OGTT) was identified by more than 80 % of the resident of both specialities but they were unable to answer the correct cut-off for GDM. Screening time was correctly identified by 73% of OBG trainees as compared to only 50% of medicine trainees. A study done in India in 2015 showed low standard of screening practices by doctors in the public health centre²¹ addressed this knowledge gap and as a result another study published in 2021 showed almost all resident were aware of the universal testing for GDM and correctly identifying the cut off value of screening test.²¹ Therefore, continuing medical education on GDM is needed to improve the knowledge and skills of health professionals.²²

The knowledge about carbohydrate intake, calorie intake and glycemic index

was very poor in OBG trainees and was also low in medicine trainees. Same deficiency in diet knowledge has been reported in a study done in Cairo.²³ This shows that post-graduate students are not following evidence-based practice. This highlights the importance of integrated multidisciplinary training modules with summative assessment in postgraduate training rotations.

Regarding management of DM, our trainees were poor in identifying the post-prandial target blood glucose levels. Very surprisingly the post-IMM trainees of medicine were not aware about various types of insulin, insulin contraindications and tocolytics being contraindicated in DM patients. One of the study on pre-diabetes done in Islamabad also identified same knowledge gap of medical students and even practising physicians regarding diabetes management.¹⁹

Neonatal hypoglycemia and respiratory distress syndrome are significantly

TABLE III: MANAGEMENT OF GESTATIONAL DIABETES MELLITUS

Variable	OBG Trainees (n=116)	Medicine Trainees (n=120)	Total (n=236)	P value
Correct diagnosis of blood glucose level for diet & exercise	111(95.7%)	116(96.7%)	227 (96.2%)	.91
Correct diagnosis of exercise time	80(69%)	91(75.8)	171 (72.5%)	.238
Correct diagnosis of caloric intake	23(19.8%)	80(66.7%)	123(43.64%)	.000
Correct diagnosis of CHO intake	48(40.8%)	71(59.2%)	119 (59.42%)	.006
Correct diagnosis of low glycemic	58(50%)	80(66.7%)	138(58.47%)	.004
Correct identification of fasting blood glucose level	112(96.6%)	115(95.8%)	227(96.18%)	.773
Correct identification of post prandial blood glucose level	79(68.1%)	63(52.5%)	142(60.17%)	.014
Correct identification of blood glucose levels during labour	101(87.1%)	101(84.2%)	202(85.6%)	.430
Correct identification for GDM group to be management by oral hypoglycaemic agents	110(94.8%)	81(67.5%)	191(81.3%)	.000
Correct identification for GDM group with obstetric complication for management with insulin	99(85.3%)	108(90%)	207(87.7%)	.227
Correct identification for GDM group with raised FBS for management with insulin	59 (50.9%)	84(70%)	143(60.5%)	.003
Correct identification of basal insulin	80(69%)	53(44.2%)	123(56.3%)	.000
Correct identification of insulin not recommended in pregnancy	37(39.1%)	35 (29.2%)	72(30.5%)	.649
Correct identification of parameter for insulin dose calculation	80(69%)	115(95.8%)	195(82.6%)	.000
Correct distribution of calculated insulin dose	113(97.4%)	119(99.2%)	232(98.3%)	.297
Correct selection of insulin combination	78(67.2%)	59(49.2%)	137(58.05%)	.01
Correct selection of tocolytics	110(94.8%)	56(46.7%)	166(70.3%)	.000

GDM: Gestational Diabetes Mellitus; OGTT: Oral Glucose Tolerance Test; FBS: Fasting blood sugar; RBS: Random blood sugar; OBG: Obstetrics & Gynecology

TABLE IV: KNOWLEDGE ABOUT NEONATAL AND POSTNATAL CARE

Variable	OBG Trainees (n=116)	Medicine Trainees (n=120)	Total (n=236)	P value	
Neonatal Care	Correct selection of time for neonatal blood glucose checking	101 (87.1%)	101 (84.2%)	202 (85.5%)	.526
	Correct neonatal blood glucose levels identified	18 (15.5%)	12 (10%)	39 (12.7%)	.20
	Correct neonatal hypoglycaemia blood glucose level identified	29 (25%)	18 (15%)	47 (19.9%)	.05
Postnatal Care	Correct time of postnatal follow-up identified	104 (89.7%)	68 (56.7%)	172 (72.9%)	.000
	Best follow-up blood sugar test is identified	41 (35.3%)	26 (21.7%)	67 (28.3%)	.02
	Women with type 2 diabetes were correctly identified	85 (73.3%)	107 (89.2%)	192 (81.3%)	.002
	Annual follow-up test was correctly identified.	39 (33.6%)	25 (2.8%)	64 (27.11%)	.000

OBG: Obstetrics & Gynecology

associated with GDM²⁴ but like GDM, the guidelines on diagnosis and management of neonatal hypoglycemia are also controversial.²⁵ The obstetrician is the first person to welcome neonate to this world, must be aware of the neonatal hypoglycemia and its management as first line emergency service. Unfortunately, our trainees of both specialties were unable to answer correctly about neonatal hypoglycemia diagnosis and management. Those with prior GDM

have more than 7-fold increased risk of developing T2DM and are also at risk of developing GDM during their subsequent pregnancies.²⁶ For the fetus, there is an increased risk of birth complications and also of future T2DM and GDM in female children.²⁷ Majority of our trainees were not clear about postnatal follow-up and diagnosis of Type 2 diabetes at postnatal check-up.

These trainees are future diabetologists, endocrinologists, medical specialist and

gynaecologists. GDM is common domain for all of them with no consensus guideline for uniform management of GDM. On the other hand, GDM has both short term and long term maternal, fetal and neonatal implications. This study has identified basic gaps in clinical practice of future consultants and raised the need of combined local guidelines addressing needs of our own country.

The strength of this study was being

multicentric with large sample size and trainees of two interrelated specialties.

The limitation is that study was restriction to trainees of one province only, so cannot be generalized to whole Pakistan.

The above study highlights the lacunae in the training of our PG trainees in the diagnosis & management of GDM and in turn also highlights the weaknesses of our health care system.

Knowledge of GDM diagnosis at the right time and timely referral to specialized centres is an essential part of any antenatal services even if run by midwives.

For better postgraduate training & good patient care, the following should be ensured.

1. Joint antenatal diabetic clinics by obstetrician and physician in each teaching hospital along with facility of a dietician and a diabetic nurse.
2. Proper protocols for early detection of GDM with separate antenatal booking cards mentioning blood sugar records and free mixed injection dosage and administration protocol.
3. Postnatal counselling regarding life style changes before discharge and follow-up screening at 6 weeks should be made mandatory.
4. Pre pregnancy counselling for next time is to be improved.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

FG: Concept and study design, acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published.

RB: Acquisition of data, drafting the manuscript, approval of the final version to be published.

SS, SB & RK: Acquisition of data, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request



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