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Frequency of Gestational Diabetes Mellitus in Pregnant Women Reporting to a Public Sector Tertiary Care Hospital of Quetta

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ABSTRACT

Objective: To determine the frequency of gestational diabetes mellitus in pregnant women reporting to a public sector tertiary care hospital and find the association of gestational diabetes mellitus with age.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Pathology Department, Combined Military Hospital, Quetta Pakistan, from Jan 2016 to Mar 2017.

Methodology: Five hundred and thirty pregnant women who reported to the Pathology Department of the hospital for an Oral Glucose Tolerance Test at 24-28 weeks of gestation were included. The blood samples were taken after ten hours of fasting and one hour and two hours after loading with 75g of anhydrous glucose and analyzed using the enzymatic (Glucose Oxidase) method. Gestational diabetes mellitus was diagnosed using guidelines recommended by the International Association for Diabetes and Pregnancy Study Group /American Diabetic Association for a one-step diagnosis of gestational diabetes mellitus according to the new criteria.

Results: The frequency of gestational diabetes mellitus was quite high 190(35.8%). Of these 530 pregnant women, 162(85.3%) women were diagnosed with Fasting Plasma Glucose, and 28 women were diagnosed with 1-hour or 2-hour after the glucose load test. Age-group of ≥ 30 years had the highest number of women with gestational diabetes mellitus.

Conclusion: The frequency of gestational diabetes mellitus in our hospital-reported sample of pregnant women was 35.8%, associated with advanced age. The maximum number of women were diagnosed as having gestational diabetes mellitus based on the fasting Plasma Glucose cut-off value.

Keywords: Gestational diabetes mellitus, Oral glucose tolerance test, Pregnancy.

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INTRODUCTION

Gestational diabetes mellitus (GDM) is a condition of glucose intolerance that begins or is first recognized during pregnancy.[1] GDM has become an important public health problem owing to its growing prevalence and association with adverse pregnancy outcomes and type 2 diabetes mellitus (T2DM) later in life. In a meta-analysis by Bellamy *et al*. women with GDM had a sevenfold increased risk of T2DM for several years compared to women with normal glucose tolerance during pregnancy.[2] GDM is associated with adverse maternal and perinatal outcomes, such as fetal overgrowth, shoulder dystocia, operative delivery, birth injury, pre-eclampsia, haemorrhage, cardiovascular disease, and preterm delivery.[3,4]

The prevalence of GDM in Pakistan varies from <1% to 26.3%, depending upon the population studied.[5,6] This is generally attributed to differences in living conditions, socio-economic status, and dietary habits. The data regarding the prevalence of GDM and the number of women affected are vital to allow for judicious planning and allocation of resources and the preventive strategies that may be undertaken in future. Because diverse prevalence rates have been observed in studies in different regions of Pakistan (22% in Baluchistan), multiple regional studies in different subtypes of populations are needed to quantify frequency and risk factors associated with it.[7-10] The present study was, therefore, undertaken to determine the GDM in women reporting to a tertiary care hospital in Quetta.

METHODOLOGY

This was a cross-sectional comparative study carried out at the Pathology Department, Combined Military Hospital, Quetta and Quetta Institute of Medical Sciences, Quetta Pakistan from January 2016 to March 2017 after taking permission from the

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Institutional Review Board (Certificate Number: 1/Path/2017). A sample size of 264 was estimated via EpiTools Epidemiological Calculator,while keeping the significance level at 5%, confidence level at 95%, and estimated proportion as 22%.[11]

Inclusion Criteria: Pregnant women of 24-28 weeks of gestation were included in the study.

Exclusion Criteria: Pregnant women with overt diabetes mellitus or taking medicines known to affect glucose metabolism were excluded from the study.

Through non-probability consecutive sampling 530 pregnant women were included, who reported for oral glucose tolerance test (OGTT) at 24-28 weeks of gestation after informed consent. The blood samples were taken after ten hours of fasting and 1 hour and 2 hours after loading with 75g of anhydrous glucose and analyzed using the enzymatic (Glucose Oxidase) method on Clinical Chemistry AnalyzerSelectra E (Vital Scientific). The samples were centrifuged and analyzed immediately. Two levels of quality control samples were run in each batch after calibration. The controls were in lyophilized form. The Westgard Rules were used to assess quality control. The fasting plasma glucose (FPG) and plasma glucose levels 1 and 2 hours after glucose load were estimated as recommended by the International Association for Diabetes and Pregnancy Study Group (IADPSG)/American Diabetic Association (ADA) for one-step diagnosis of GDM according to the new criteria. At least two readings that were equal to or exceeded 5.1mmol/L for FPG, 10mmol/L for 1-hour after glucose load, and 8.5 mmol/L for 2-hours after glucose load were labelled as GDM.[12]

Statistical Package for Social Sciences (SPSS) version 20.0 was used for the data analysis. Descriptive statistics were calculated for age and plasma glucose levels at fasting and 1 and 2 hours after the oral glucose load. The study participants were divided into three groups for age, i.e.≤ 20 years, between 21-30 years, and > 30 years. Therefore, ANOVA was used to compare mean values of FPG and plasma glucose levels 1-hour and 2-hour after glucose load among different age groups. The *p*-value ≤0.05 was taken as statistically significant.

RESULTS

There were 530 women with a mean age of 29.01±4.48 years ranging from 19-43 years. There were Eight (3%) women in ≤20 years Age-Group, 181(68.3%) women in 21-30 years Age-Group and 76(28.7%) women in >30 years Age-Group. Overall, 190 out of 530(35.8%) women were diagnosed with GDM. Of these women with GDM, 162(85.3%) were diagnosed by FPG using ADA diagnostic criteria. Among these 162 women, a 1-hour after-glucose load test was also positive in 18 women, and a 2-hour after-glucose load test was positive in 20 women. However, in 28 women, all three values were above the cut-off values. Association of gestational diabetes mellitus with age groups was shown in the Table-I.

Table-I: Association of Gestational Diabetes Mellitus with Age Groups (n=530)

Assessment of Plasma Glucose Levels	Age ≤ 20 years n(%)	Age: 21-30 years n(%)	Age >30 years n(%)
Gestational diabetes mellitus	0	118(32.6)	72(47.4)
Plasma Glucose Levels within the Reference Range	16(110)	244(67.4)	80(52.6)

Twenty-eight women were diagnosed by 1-hour or 2-hour after glucose load test where FPG was <5.1mmol/L. Of these, 12 women had both 1-hour and 2-hour after glucose load tests below the cut-off range, and 14 women had only 2-hours after the glucose load test below the cut-off value for GDM. Only two women were diagnosed using a 1-hour post-glucose-load cut-off value. The mean levels for FPG and plasma glucose after 1 and 2 hours of oral glucose challenge were significantly higher in the age-group of ≥30 years (p=0.005, p<0.001 and p=0.026, respectively) (Table-II).

Table-II: Comparison of Mean Values of Plasma Glucose Levels at Fasting and at One and Two Hours after Oral Glucose Load Challenge (n=530)

Assessment of Plasma Glucose Levels	Age ≤20 years Mean±SD	Age:21-30 years Mean±SD	Age >30 years Mean±SD	*p*-value
Fasting Plasma Glucose	4.61±0.29	4.86±0.62	5.09±0.78	0.005
Plasma glucose 1 hour After Glucose Load	6.68±1.11	7.78±1.67	8.42±1.68	<0.001
Plasma glucose 2 hours after glucose load	6.21±1.22	6.70±1.72	6.98±1.51	0.026

DISCUSSION

The frequency of GDM was 35.8% in our study. This is high when compared to a previous study from Balochistan 9(22%) and other studies from other areas of Pakistan (<1% to 26.3%). This is because GDM has an association with many factors that include family history, maternal age, parity, educational level, ethnicity, maternal occupation, polyhydramnios, history of GDM, anaemia, stress, hypertension, history of abortions, lack of exercise, pre-pregnancy weight, and

BMI.[12,13] These factors had not been explored in our study and this might have resulted in different results. This was also one of the limitations of our study.

We found that maternal age was positively associated with the frequency of GDM. A similar association had been observed in earlier studies from other parts of Pakistan by Bibi *et al*. Fatima *et al.* Saeed *et al.* and Khan *et al*.[5-13] The reason given for this association is similar to the reason behind the development of T2DM, i.e. with age, the pancreas starts producing insulin less effectively. Maternal age is an established risk factor for GDM, but there is no consensus on the age above which there is a significantly increased risk of GDM. In the literature, the lowest recommended cut-off age is 25 years for GDM, as recommended by the American Diabetes Association.[14]

In our study, most women (85.3%) were diagnosed with GDM using ADA cut-off levels of FPG. Our finding is similar to the previous studies who noted that the maximum number of women were diagnosed based on the FPG cut-off value of 5.1 mmol//L.[15-17] Over the years, FPG has been widely applied as a screening test for GDM, given its advantages of being less expensive, more reproducible, well accepted, and easier to administer universally.[15,16]

GDM is an international health issue of concern. A recent review of GDM prevalence showed that Southeast Asian populations had the highest prevalence of GDM overall, with approximately 23% of the pregnancies getting affected.[17] A study from the USA reported an incidence of 8.2% for GDM in 2016.[18] Early detection of GDM is necessary to reduce or avert short and long-term adverse consequences of GDM on the foetus and the mother, the most significant of which is a pre-disposition to the development of metabolic syndrome andT2DM.[19] There is also a dire need to educate healthcare professionals making them aware of the benefits of early management of diabetes and appropriate use of OGTT for timely diagnosis.

Our study has added considerably to the limited data regarding GDM from the Baluchistan province. Our study had a larger sample size (n=530) and thus has given a better picture of the on-ground prevalence of GDM in Baluchistan province. However, large population-based trials are necessary to truly assess the disease burden of GDM in Baluchistan women.

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CONCLUSION

The frequency of gestational diabetes mellitus in our hospital-reported sample of pregnant women was 35.8%, associated with advanced age. The maximum number of women were diagnosed as having gestational diabetes mellitus based on the fasting Plasma Glucose cut-off value.

Conflict of Interest: None.

Authors' Contribution

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

ML & SBA: Study design, data acquisition, critical review, approval of the final version to be published.

MA & MM: Conception, drafting the manuscript, approval of the final version to be published.

MA & MI: Data analysis, data interpretation, critical review, approval of the final version to be published.

SARSB & MA: Critical review, drafting the manuscript, 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.

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