Maternal Outcomes in Pregnancies Complicated by Gestational Diabetes Mellitus in Western Kenya

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Abstract: **Gestational diabetes Mellitus (GDM) is a disorder at pregnancy thought to result from maternal dysregulation of maternal glucose metabolism, causing insulin intolerance thus contributing to adverse maternal outcomes. The aim of this study was to evaluate maternal outcomes associated with gestational diabetes mellitus among pregnant women with GDM in Kisumu County, western Kenya. A case-control study was carried out among 210 pregnant women in Kisumu County. Screening and diagnosis were performed using the 2013 WHO criteria. Data was collected using a checklist and gynaecological files. Descriptive and inferential statistical analysis were done in SPSS V.23 using Chi-square ($\chi2$) test to test for associations. Results showed that of the 105 GDM cases, majority were in 30-34 years age group, married and employed. Additional analysis revealed that gestational age at delivery ≥ 40 weeks, caesarean delivery, induced labour, pregnancy induced hypertension (all p<0.001) were significantly associated with GDM. Thus, the findings, suggests that due to adverse maternal outcomes there is need for interventions such as early screening and management of GDM among the high-risk populations.**

Keywords: **gestational diabetes mellitus, maternal, obstetric, outcomes, pregnancy.**

1. Introduction

Diabetes accounts for 10% of pregnancy associated complication annually [5]. GDM is glucose or carbohydrate intolerance of inconstant severity detected for the first-time during pregnancy [13]. GDM commonly diagnosed around 24 to 28 weeks of gestation is thought to result from maternal dysregulation of maternal glucose metabolism leading to increased insulin intolerance [1]. Thus, regulating maternal glycaemia early reduces the complications for both mothers and their neonates [3] and thus is crucial in alleviating adverse maternal outcomes among pregnant women with GDM [15]. Prevalences ranges from 1% to 28% worldwide due to variations in study population genetics, environment and diagnostic/screening methods used [2]. Prevalence of GDM is rapidly increasing in regions like Kenya [14]. It is projected that by 2035 millions will be suffering from GDM [16]. Pregnancies with hyperglycemia detected early are at greater risk of adverse birth complications [17]. The adverse obstetric outcomes include hypertension, hyperglycemia, caesarean section, development of T2DM in future [14]. Despite such facts, there is a scarcity of data on adverse maternal outcomes in pregnancy complicated by GDM in Kenya. Therefore, the aim of this study was to evaluate the maternal outcomes among women with GDM.

2. Methodology

This was a case-control study that targeted pregnant women, 18 years or older with singleton pregnancies, between 24- and 32 weeks gestation with a maximal range to 42 weeks, were eligible for inclusion who were attending antenatal, maternity and child health clinics of the Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH). Ethical approval was sought from JOOTRH Ethics Review Committee. Informed consent was sought from all the study participants using an approved consent form. Study participants were sampled through simple random technique and a sample size of 210 (105 cases and 105 Controls) was selected. Data was captured using a checklist and gynaecological files. Screening for GDM was done according to WHO recommendations. Data was analysed using descriptive and inferential statistical methods aided by SPPS (Statistical Package for the Social Sciences, version 23). Descriptive data was presented by frequencies and percentages. Pearson Chi-square and Fisher's exact test were used for comparison of categorical variables between groups. P-value ≤ 0.05 was considered significant.

3. Results

Data was obtained from a total of 210 pregnant women (105 cases with GDM and 105 controls without GDM). Table 1 shows the sociodemographic characteristics of the participants investigated and a majority of participants with GDM were in 30-34 years age group (54, 51%), married (79, 75%), had secondary education (54, 52%) and unemployed (37, 36%).

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A. Maternal outcomes associated with GDM

Pearson Chi-square and Fisher's exact test revealed that GDM was associated with gestational age at delivery ≥ 40 weeks, Caesarian Delivery, induced labour, pregnancy-induced hypertension (all $p<0.001$). Both univariate and multivariate logistic regression analysis revealed that gestational age at delivery ≥ 40 weeks (Adjusted Odds Ratio (aOR) 1.67, 95% CI 1.29-2.21, $p<0.001$), caesarean delivery (aOR7.28, 95%CI 3.17-18.0, $p<0.001$), induced labour (aOR 4.60, 95%CI 2.07-10.8, $p<0.001$) and pregnancy induced hypertension (aOR15.2, 95% CI 3.92-103, $p<0.001$) were significantly associated with GDM.

Table 1
Sociodemographic characteristics of the participants (n=210)

Variable	Gestational Diabetes Status	
	GDM = 105	no GDM=105
Age in years		
<25	1(0.9)	41(39)
25-29	1 (0.9)	48 (45.7)
30-34	54 (51.4)	16 (15.2)
≥35	49 (46.7)	0 (0%)
Marital Status		
Married	79 (75.2%)	82 (78%)
Unmarried	26 (24.8%)	23 (21.9%)
Residence		
Rural	28 (26.7%)	35 (33.3%)
Urban	39 (37.1%)	46 (43.8%)
Peri-urban	38 (36.2%)	24 (22.9%)
Education level		
None	0 (0%)	1 (1.0%)
Primary	28(26.7%)	16 (15.2%)
Secondary	54 (51.4%)	70 (66.7%)
Tertiary	23 (21.9%)	18 (17.1%)
Employment status		
Employed	72 (68.6%)	41 (39%)
Unemployed	33 (31.4%)	64 (61%)

B. Discussion

Early diagnosis of GDM is critical as it informs clinical decision-making including life style changes, medical nutrition therapy and insulin therapy aimed at reducing adverse maternal outcomes associated with GDM [6]. As much as screening and diagnosis of GDM in asymptomatic pregnant women is still a challenge and controversial, healthcare providers should identify and screen pregnant women who are at high risk of GDM earlier using traditional risk factors for proper management of GDM and to avoid adverse maternal complications [7]. For maternal adverse outcomes, women with GDM had increased odds of gestational age at delivery ≥ 40 weeks, caesarean delivery, induced labour and pregnancy induced hypertension consistent with previous studies [12], [4]. Our observation that GDM increases the risk of CS delivery is consistent with findings [8]. Increased risk of caesarean delivery among pregnant women with GDM may be partly attributed to maternal hyperglycemia that leads to the fact that women with GDM may affect clinical decision-making due to the increased risks of adverse maternal outcomes [9]. Pregnancy induced hypertension associated with adverse pregnancy outcomes like risk of perinatal mortality hence the need of caesarean delivery to decrease the risks of adverse pregnancy outcomes in women with pregnancy induced

hypertension [10]. Among pregnant women with GDM, routine induction of labor at 38 or 39 weeks is associated with a lower risk of cesarean delivery in nulliparous women, decreased pregnancy-related hypertension in multiparous and nulliparous women and increased time in labor and delivery [11]. Our finding on increased odds of induced labour among pregnant women with GDM may be informed by clinical decision making to reduce the risk of caesarean delivery and other adverse pregnancy outcomes as previously observed [12].

4. Conclusion

GDM was significantly associated with gestational age at delivery ≥ 40 weeks, caesarean delivery, induced labor and pregnancy induced hypertension. Henceforth there is need for increased antenatal health education and interventions focusing on management of pregnancy among women with GDM in order to reduce adverse maternal outcomes.

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