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OBSTETRICAL AND PERINATAL OUTCOMES AMONG DIABETIC MOTHERS DELIVERED AT KIGALI UNIVERSITY TEACHING HOSPITAL (CHUK).

Dissertation submitted for partial fulfilment of the requirement for the award of Masters of Medicine in Obstetrics and Gynecology of the University of Rwanda

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September, 2022

Obstetrical and perinatal outcomes among diabetic mothers delivered at Kigali Univ

DECLARATION

I, Isidore IRAMBONA, hereby declare and certify that the work pre

entitled **"OBSTETRICAL AND PERINATAL OUTCOMES**

MOTHERS DELIVERED AT KIGALI UNIVERSITY TEACHIN(

is entirely my original work and it has never been presented or submitt

any other university.

Isidore IRAMBONA, MD Signature: .....

Main supervisor:

I hereby declare that this dissertation has been submitted with my approv

Dr. BAGAMBE Patrick, MD, MMed Signature: .....

Co-supervisor:

Dr NTASUMBUMUYANGE Diomede, MD, MMed

DEDICATION

To God the almighty

To my wife and my children

To my classmates and other people who contributed to my study

I dedicate this work

ACKNOWLEDGEMENT

First of all, my gratitude goes to Dr. BAGAMBE Patrick and Dr. NTASUMBUMUYANGE Diomede who accepted to supervise this work. Your patience and dedication of your time despite your busy schedules led to the completion of this work.

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For you all cited or forgotten, your contribution to my studies in Master of Medicine in Obstetrics and Gynecology program, is appreciated and I say thank you.

IRAMBONA Isidore

ABBREVIATIONS AND ACRONYMS

CHUK: Kigali University Teaching Hospital

DM : Diabetes Mellitus

GDM: Gestational Diabetes Mellitus

IFD: International Federation of Diabetes

C/S: Caesarean Section

IUFD: Intra-Uterine Fetal Death

RDS: Respiratory Distress Syndrome

IADPSG: The International Association of the Diabetes and Pregnancy Study Groups

IRB: Institutional Review Board

UR-CMHS: University of Rwanda, College of Medicine and Health Sciences

NICU: Neonatology Intensive Care Unit

BMI: Body Mass Index

CI: Confidence Interverval

OR: Odds Ratio

LGA: Large for GA

PIH: Pregnancy Induced Hypertension

SVD: Spontaneous Vaginal Delivery

Table of Contents

ABSTRACT

Background:

Diabetes adversely affects women and their babies during pregnancy, labor, and delivery. Miscarriage, cesarean sections (C/S), birth trauma, pregnancy induced hypertension (PIH), , obstructed labor, and so forth are among the effects of diabetes on maternal outcomes of pregnancy while macrosomia, congenital anomalies, birth injury, hypoglycemia, intrauterine fetal death (IUFD), stillbirth, shoulder dystocia, respiratory distress syndrome (RDS), polycythemia, and hyperbilirubinemia and so forth are perinatal and neonatal morbidities.

Aim: To evaluate the obstetrical and perinatal outcomes among diabetic mothers delivered at CHUK in order to assess the magnitude of burden played by diabetes mellitus during the peri-partum period.

Methods: A retrospective cross-sectional study conducted at CHUK which is a tertiary-level hospital located in Kigali city. Data were analyzed using Stata version 13. Logistic regression analysis was used to study the differences in maternal and neonatal outcomes among diabetic and non-diabetic mothers.

Results: A significant difference was observed in having polyhydramnios among diabetic and non-diabetic patients where all six patients (11.54%) who were diagnosed with polyhydramnios were diabetic patients (p=0.012). Diabetic patients were more likely to have PIH (21.15% vs 1.92%), (p=0.012), to give birth to macrosomia babies (19.23% vs 3.85%), (p=0.014) compared to non-diabetic mothers. Hypoglycemia and stillbirth were more likely observed among diabetic mothers. Babies born from diabetic mothers had more neonatal jaundice (25.00%) compared to babies from non-diabetic mothers (9.62%) with a statistically significant difference (p=0.038). Mothers who were aged >35 years were 2.6 times more likely to have maternal complication compared to those who are aged less than 35 years (OR=2.55; 95% CI: 1.01-8.21; p=0.043).

Conclusion: The study identified pregnancy induced hypertension (21.15%) and polyhydramnios (11.54%) as adverse maternal outcomes among diabetic mothers while macrosomia (19.23%), hypoglycemia (26.92%), jaundice (25.00%) and stillbirths (9.62%) were identified as adverse fetal outcomes among diabetes mothers delivering at CHUK. Diabetes mother who were aged >35 years were 2.9 times more likely to have maternal complication as those who are aged less than 35 years. Therefore we recommend enhancing counselling of pregnant diabetic mothers on diabetes mellitus control to prevent maternal and fetal complications and to enhance education of the general population on lifestyle changes in preventing diabetes.

Key words: Gestational Diabetes Mellitus , Pre-gestational Diabetes Mellitus, Pregnancy induced hypertension, Polyhydramnios, Hypoglycemia, Jaundice, Stillbirth

I. INTRODUCTION

1.1. Background

Diabetes mellitus (DM) in pregnancy can be of three types including preexisting Type 1 or type 2 and gestational diabetes mellitus (GDM). GDM develops for the first time during pregnancy (1). In around one third of women, GDM precedes the type 2 DM and it is reported to be associated with DM in descendants and an increased risk of obesity (2). According to the International Federation of Diabetes (IFD), in 2019, 15.8% of live births were from mothers with any form of hyperglycemia (3); Among these above mentioned cases, 83.6% of them were cases of GDM, 7.9% by diabetes discovered before pregnancy, and 8.5% were cases of pre-existing diabetes (including type 1 and type 2) that were first diagnosed during pregnancy (3). Diabetes plays a negative impact on the results of pregnancy among pregnant mothers and their babies either during pregnancy, labor or delivery. Diabetes is also linked to high maternal morbidity, such as miscarriage, caesarean sections (C/S), birth trauma, PIH, obstructed labor, and so forth. Additionally, there is an increase in perinatal and neonatal morbidities, which include shoulder dystocia, congenital malformations, birth injuries, hypoglycemia, intrauterine fetal death (IUFD), stillbirth, and so forth (4)(5).

Hyperglycemia adverse-pregnancy outcome studies have demonstrated a correlation between maternal hyperglycemia levels and adverse maternal and perinatal outcomes(6). Pre-GDM frequently results in major complications for the embryo, fetus and mother, that are directly related to diabetes (7). Majority of this complications might be prevented by preconception care with good glycemic control (8). Studies about the prevalence of hyperglycemia among pregnant women in sub-Saharan Africa are scarce. (9) According to recent prevalence estimates utilizing the IADPSG diagnostic criteria, the prevalence of hyperglycemia first detected in pregnancy was 8.6% and 13.1% respectively in Nigeria and Tanzania (10)(11)(12). In Rwanda, only one study on diabetes mellitus in pregnancy was done and 3.2% of pregnant women receiving prenatal care at public health facilities had gestational diabetes mellitus (13).

1.2.Problem statement

Globally, diabetes, which is a common obstetric complication, is estimated to affect around 10% of all pregnancies (14). The rate of diabetes mellitus is increasing worldwide among the general population and the prevalence has been increasing more in poor and developing

world, which is blamed for rapid modernization and industrialization. It is linked with increased risk for both the mother and the newborn (14). There is a need to explore the obstetrical and perinatal outcomes among delivering diabetic mothers for estimating the level of burden played by diabetes mellitus during the peri-partum period.

1.3. Objectives

1.3.1. General objective

To determine the obstetrical and perinatal outcomes among diabetic mothers delivering at CHUK.

1.3.2. Specific objectives

- To weigh up the obstetrical and perinatal outcomes among diabetic and non-diabetic mothers, delivering at CHUK.
- To compare the outcomes (both perinatal and obstetric outcomes) among women with type 1 and type 2 pre-GDM and those with GDM.
- To identify the predicting factors of adverse obstetrical and perinatal outcome among diabetic mothers delivering at CHUK.

1.4.Conceptual framework

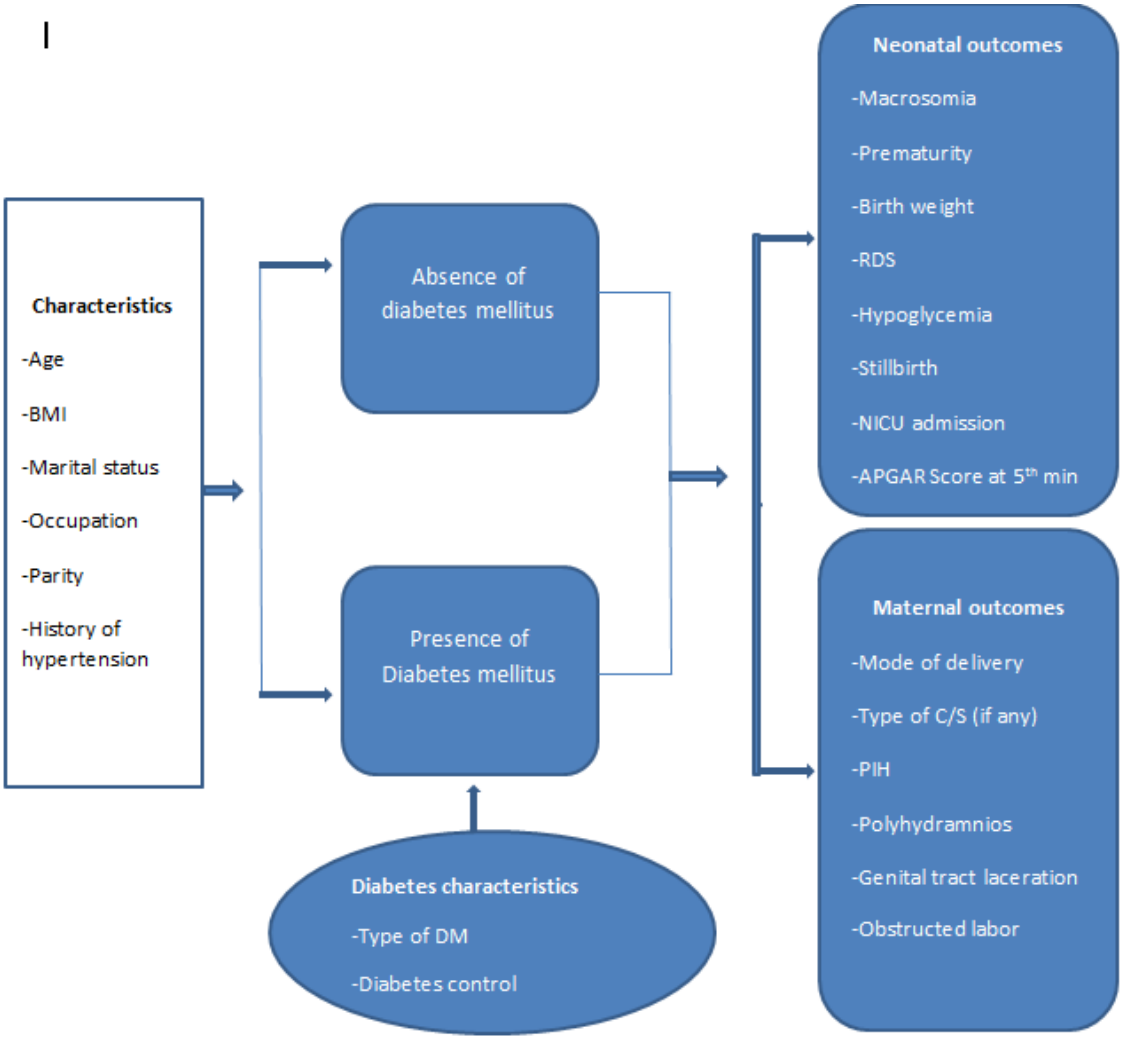

Figure 1 : Conceptual framework of relationship between diaetes mellitus and maternal and neonatal outcomes of pregnancy.

II. METHODS

2.1. Type of study and period

A retrospective case-control study, conducted for a 2 year period from January 2020 to December 2021 at CHUK.

2.2. Study Settings

The study was conducted at CHUK; in Obstetrics and Gynecology Department. CHUK is located in Kigali city and is one of the biggest tertiary-level hospitals in Rwanda with a 519 beds capacity.

2.3. Study population

The participants of this study were pregnant women admitted in Obstetrics and gynecology department at CHUK from January 2020 to December 2021 for delivery or for other complications on pregnancy.

2.4. Sampling techniques

In this study, all patients with pregnancy complicated by diabetes, pre-GDM (type 1 or type 2) or GDM, who were admitted for antenatal care services or labor and delivery from January 1st 2020 to December 31st 2021, were enrolled in the study. For comparison, pregnant patients without DM were selected using a matching considering the date of admission (study period), age and parity. The study used consecutive sampling where all available participants in the study period were enrolled.

2.5. Sample size

Fischer's formula was used to estimate the required sample size (15) as follows:

$n = Z^2 \frac{p\,(1-p)}{e2}$

n= minimum needed sample size.

Z= standard normal value equaling to 95% CI equaling to 1.96.

p= estimated prevalence of hyperglycemia in pregnancy estimated to 3.1% from the previously done study (10).

e= level of precision set at 5%.

Thus, $n = 3.84 \frac{0.031\,(1-0.031)}{0.0025} = 46$

The minimum required sample from our population was 102 participants and we were able to recruit 104 participants whose 52 participants were diabetic mothers and other 52 were non-diabetic mothers.

2.6. Sources of data and collection of data

Data were retrieved from mothers' files (electronic records, mothers' files and registers) from admission, labor and delivery and operating theater at CHUK.

Data were collected using a designed form that was adopted from other questionnaires used in previous studies (5,16) and the collected data included information on characteristics of the

participants, patients' medical and obstetrical history, and then the maternal and fetal outcomes of pregnancy were recorded.

2.7. Data analysis

Data were entered in Epidata version 3.1 then exported to Stata version 13 for analysis. Chi-square test and logistic regression analysis were used to identify the associations between variables. Social and clinical factors namely age, body mass index, marital status, occupation, parity and history of hypertension among mothers with diabetes and those without were studied and the neonatal outcomes namely neonatal macrosomia, prematurity, birth weight, respiratory distress syndrome, hypoglycemia, stillbirth, NICU admission, and APGAR score at 5^{th} minute and then maternal outcomes namely mode of delivery, type of cesarean section if done, pregnancy induced hypertension, polyhydramnios, genital tract lacerations, and obstructed labor were compared between diabetic and non-diabetic mothers.

Significant association between variables was considered at $p < 0.05$.

2.8.Ethical consideration

2.8.1. Ethical approval

The protocol was presented and received approval from the IRB of University of Rwanda/CMHS and before data collection at CHUK; the study was again presented to CHUK ethics committee and granted the permission to collect data.

As the study was retrospective which made no threats to participants and we did not meet study participants in person, thus no consent form was needed.

2.8.2. Confidentiality

Collected information was kept confidential and patients' identifiers such names were not collected.

III. RESULTS

The study recruited one hundred and four mothers, 52 (50%) were diabetic patients and the remaining 52 (50%) were non-diabetic patients who presented at CHUK in the department of obstetrics and gynecology.

The mean age of participants was 33.6 years with 69.2% having age of 35 years and below, 50.96% were employed. Among all the study participants, only 34.62% had normal BMI, 31.7% were overweight and 33.6% had obesity (Table 1).

Table 1: Characteristics of study participants (social, demographic and clinical)

Characteristics	Diabetic mothers	Non-diabetic mothers	P value
Age (Mean ± SD)	34.23 ± 5.39	33.05 ± 4.29	0.223
Age Groups			
≤35 years	32 (61.54%)	40 (76.92%)	0.089
>35 years	20 (38.46%)	12 (23.08%)	
Occupation			
Employed	27 (51.92%)	24 (46.15%)	0.556
Unemployed	25 (48.08%)	28 (53.85%)	
Marital status			
Married	47 (90.38%)	49 (94.23%)	0.462
Unmarried	5 (9.62%)	3 (5.77%)	
BMI category			
Normal	15 (28.85%)	21 (40.38%)	0.06
Overweight	13 (25.00%)	20 (38.46%)	
Class 1 obesity	14 (26.92%)	7 (13.46%)	
Class 2 obesity	10 (19.23%)	4 (7.69%)	
Parity			
Primiparous	7 (13.46%)	15 (28.85%)	0.055
Multiparous	45 (86.54%)	37 (71.15%)	
History of IUFD			
Yes	6 (11.54%)	1 (1.92%)	**0.05**
No	46 (88.46%)	51 (98.08%)	
History of macrosomia or LGA			
Yes	9 (17.31%)	1 (1.92%)	**0.008**
No	43 (82.69%)	51 (98.08%)	
History of abortion			
Yes	15 (28.85%)	9 (17.31%)	0.163
No	37 (71.15%)	43 (82.69%)	
History of Hypertension			
Yes	10 (19.23%)	0 (0.00%)	**0.001**
No	42 (80.77%)	52 (100%)	

Of 52 patients with diabetes mellitus, 48.0% had gestational diabetes, 40.4% had type 2 diabetes mellitus and 11.54% had type 1 diabetes mellitus. Only 36.54% of the total number of patients with diabetes mellitus had their diabetes mellitus controlled and 66.67% of them were taking only insulin as treatment of diabetes mellitus, 8 patients (14.81%) were on insulin combined with oral medications, 6 patients (11.11%) were on oral medications only (metformin) and 4 patients (7.41%) were on lifestyle modification with diet only. Seven patients (13.46%) were found to have complications of diabetes where 5 patients had nephropathy and 2 patients had vasculopathy (Table 2).

Table 2: Diabetes-related characteristics among the study participants

Variables	n	%
With Diabetes		
Yes	52	50
No	52	50
Type of diabetes		
Gestational DM	25	48.08
Type II pre-GDM	21	40.38
Type I pre-GDM	6	11.54
Diabetes control using HbA1c		
Controlled (HbA1c ≤6.5)	19	36.54
Uncontrolled (HbA1c >6.5)	33	63.46
Diabetes management		
Insulin only	36	66.67
Insulin and Oral medications	8	14.81
Metformin only	6	11.11
Diet only	4	7.41
Duration of treatment in months		
Median (Min-Max)	12 (1-120)	
Frequency of complications of diabetes		
Vasculopathy	2	3.85
Nephropathy	5	9.62

There was a statistically significant difference in having polyhydramnios among diabetic and non-diabetic patients where all six patients who were diagnosed with polyhydramnios were diabetic patients (p=0.012). Diabetic patients were 13.6 times to have PIH compared to non-diabetic patients (OR=13.6; 95% CI: 1.69-110.4; p=0.012), and the proportion of PIH was 16% of patient with GDM and 25.93% of patient with Pre-GDM. Genital tract lacerations were present in diabetic patients 5.4 times compared to non-diabetic patients (p=0.129). No observed differences in onset of labor, mode of delivery, type of Cesarean section, and having obstructed labor across diabetic and non-diabetic mothers (Table 3).

Table 3: Comparison of maternal outcomes of pregnancy among diabetic and non-diabetic mothers

Variables	Diabetes status of the mother		OR (95% CI)	P value
	Diabetic	Non-diabetic		
Mode of delivery				
SVD	16 (30.76%)	25 (48.07%)	Ref	
Instrumental delivery	2 (3.84%)	1 (1.92%)		
C/S	34 (65.38%)	26 (50.00%)	2.04 (0.91-44.58)	0.083
Type of C/S				
Emergency	12 (42.86%)	17 (53.13%)	0.66 (0.24-1.84)	0.427
Elective	16 (57.14%)	15 (46.88%)	Ref	
PIH				
Yes	11 (21.15%)	1 (1.92%)	13.6 (1.69-110.4)	0.014
No	41 (78.85%)	51 (98.08%)	Ref	
Polyhydramnios				
Yes	6 (11.54%)	0 (0.00%)		0.012
No	46 (88.46%)	52 (100%)		
Genital tract laceration				
Yes	5 (9.62%)	1 (1.92%)	5.42 (0.61-48.15)	0.129
No	47 (90.38%)	51 (98.08%)	Ref	
Obstructed labor				
Yes	3 (75.00%)	1 (25.00%)	3.12 (0.31-31)	0.331
No	49 (49.00%)	51 (51.00%)	Ref	

Diabetic mothers were 5.9 times more likely to deliver babies with macrosomia compared to non-diabetic mothers (OR=5.9; 95%CI: 1.23-28.68; p=0.026). Babies born to diabetic mothers were 6 times more likely to have hypoglycemia as to those born from mothers without diabetes mellitus (OR=6.01; 95% CI: 1.61-22.4; p=0.004). Diabetic mothers had more stillbirths compared to non-diabetic mothers where 5 of 52 (9.62%) diabetic mothers had stillbirth while no one from non-diabetic mothers had stillbirth (p=0.022). Babies born from diabetic mothers had neonatal jaundice compared to babies from non-diabetic mothers (OR=3.13; 95% CI: 1.02-9.55; p=0.044). There was no statistically significant difference in preterm delivery, birth weight, neonatal respiratory distress syndrome, neonatal birth injury, NICU admission and poor APGAR at 5^{th} minutes among babies born from women with diabetes and those without (Table 4).

Table 4: Comparison of neonatal outcomes of pregnancy among diabetic and non-diabetic mothers

Variables	Diabetes status of the mother		OR (95% CI)	P value
	Diabetic	Non-diabetic		
Macrosomia				
Yes	10 (19.23%)	2 (3.85%)	5.95 (1.23-28.68)	**0.026**
No	42 (80.77%)	50 (96.15%)	Ref	
Preterm				
Yes	14 (26.92%)	7 (13.46%)	2.36 (0.86-6.47)	0.092
No	38 (73.08%)	45 (86.54%)	Ref	
Low birth weight				
Yes	6 (11.54%)	5 (9.62%)	1.22 (0.35-4.29)	0.75
No	46 (88.46%)	47 (90.38%)	Ref	
RDS				
Yes	10 (19.23%)	7 (13.46%)	1.53 (0.53-4.38)	0.426
No	42 (80.77%)	45 (86.54%)	Ref	
Hypoglycemia				
Yes	14 (26.92%)	3 (5.77%)	6.01 (1.61-22.4)	**0.004**
No	38 (73.08%)	49 (94.23%)	Ref	
Stillbirth				
Yes	5 (9.62%)	0 (0.0%)		**0.022**
No	47 (90.38%)	52 (100%)		
Jaundice				
Yes	13 (25.00%)	5 (9.62%)	3.13 (1.02-9.55)	**0.044**
No	39 (75.00%)	47 (90.38%)	Ref	
Birth injury				
Yes	2 (3.85%)	1 (1.92%)	2.04 (0.17-23.21)	0.565
No	50 (96.15%)	51 (98.08%)	Ref	
NICU admission				
Yes	14 (26.92%)	9 (17.31%)	1.76 (0.69-4.52)	0.24
No	38 (73.08%)	43 (82.69%)	Ref	
Poor APGAR at 5th min				
Yes	3 (5.77%	2 (3.85%)	1.53 (0.24-9.56)	0.648
No	49 (94.23%)	50 (96.15%)	Ref	

Diabetic mothers with pre-GDM (type 1 and type 2 pre-GDM) were more likely to have fetal complications compared to those who had gestational diabetes no significant difference (Table 5).

Diabetic mothers with uncontrolled diabetes were 2.84 times more likely to have fetal complications as diabetic mothers with controlled diabetes mellitus (OR=2.84; 95% CI: 0.47-17.12; p=0.254). Diabetic mothers with pre-GDM (type 1 and type 2 pre-GDM) were more

likely to have fetal complications compared to those who had gestational diabetes without statistical significance (Table 5).

Table 5: Factors associated with fetal complications among diabetic mothers

Characteristics	Any fetal complication		95% CI	P value
	Yes	No		
Age				
≤35	17 (53.1%)	15 (46.9%)		
>35	12 (60.0%)	8 (40.00%)	1.32 (0.42-4.10)	0.627
Diabetes control				
Controlled	2 (33.33%)	4 (66.67%)		
Uncontrolled	27 (58.7%)	19 (41.3%)	2.84 (0.47-17.12)	0.254
Type of diabetes mellitus				
GDM	11 (44.00%)	14 (56.00%)		
Pre-GDM	18 (66.67%)	9 (33.33%)	2.54 (0.82-7.83)	0.103
BMI				
Normal	8 (53.3%)	7 (46.7%)		
Overweight	8 (61.5%)	5 (38.5%)	1.40 (0.31-6.33)	0.662
Class I obesity	8 (57.1%)	6 (42.9%)	1.16 (0.26-5.05)	0.838
Class II obesity	5 (50.0%)	5 (50.0%)	1.33 (0.26-6.80)	0.729

Generally, mothers aged >35 years old were 2.9 times to have maternal complication as those who are aged less than 35 years (OR=2.55; 95% CI: 1.01-8.21; p=0.043). Diabetic mothers with uncontrolled diabetes were more likely to have maternal complications compared to diabetic mothers with controlled diabetes (p=0.049) (Table 6).

Table 6: Factors associated with maternal complications among diabetic mothers

Characteristics	Any fetal complication		95% CI	P value
	Yes	No		
Age				
≤35	17 (53.1%)	15 (46.9%)		
>35	12 (60.0%)	8 (40.00%)	1.32 (0.42-4.10)	0.627
Diabetes control				
Controlled	2 (33.33%)	4 (66.67%)		
Uncontrolled	27 (58.7%)	19 (41.3%)	2.84 (0.47-17.12)	0.254
Type of diabetes mellitus				
GDM	11 (44.00%)	14 (56.00%)		
Pre-GDM	18 (66.67%)	9 (33.33%)	2.54 (0.82-7.83)	0.103
BMI				
Normal	8 (53.3%)	7 (46.7%)		
Overweight	8 (61.5%)	5 (38.5%)	1.40 (0.31-6.33)	0.662
Class I obesity	8 (57.1%)	6 (42.9%)	1.16 (0.26-5.05)	0.838
Class II obesity	5 (50.0%)	5 (50.0%)	1.33 (0.26-6.80)	0.729

IV. DISCUSSION

The main objective of our study was to evaluate the obstetrical and perinatal outcomes, and to identify associated factors, among diabetic mothers delivered at Kigali University Teaching Hospital from 1st January 2020 to 31st December 2021.

The current study recruited 52 diabetic mothers and 52 non-diabetic mothers for comparison, who were admitted for labor and delivery. The current study revealed that among 52 patients with diabetes mellitus, 48.0% had GDM, 52% had pre-GDM. The similar findings were reported by Eshetu et al. where 54.6% of their participants had GDM and 45.4% pre-GDM (5). In the study done by Stogianni et al. in Sweden, 67% of participants had GDM, and 33 % had pre-GDM(16).

This higher proportion of patients with Pre-GDM in our study may be due to the fact that pregnant patients already known with DM are considered as high risk, and then referred from district hospitals during ANC, to be followed up at our study setting which is a tertiary level hospital.

Our study identified PIH as obstetric complication among diabetic mothers at 21.15% compared to non-diabetic mothers (1.9%). Our findings are similar to the finding of Stogianni et al. in Sweden who reported PIH in 21% of diabetic mother, but slightly lower than the proportion from Eshetu et al. in Ethiopia (26%), and greater than that from Saudi Arabia (14%) and in Qatar (15%) (5,16–18). The variations might rise from the differences in strategies of prevention of diabetes-related complications of pregnant women.

The results of analysis in our study showed that diabetic mothers had more proportion of polyhydramnios compared to the non-diabetic mothers with a statistically significant difference (p=0.012). The results of our study are supported by the findings reported by O'Sullivan et al. where there was an increased incidence of polyhydramnios as a pregnancy outcome in diabetic mothers (19) and the findings from the study by Kouhkan et al. from Iran pregnant women with gestational diabetes were 2.4 folds in having polyhydramnios as those without gestational diabetes (20).

The findings of analysis in our study also showed no difference in the mode of delivery namely C/S vs Spontaneous vaginal delivery from diabetic mothers' group in comparison with non-diabetic mothers' group. This finding from our study is different from the finding from that of Stogianni et al. who found an association between delivering by C/S and being diabetic (16). Our results are also different from the results from the other previously done studies (19) (8) (11).

In general a higher rate of rate of cesarean deliveries is observed in diabetes patients due to the higher incidence of macrosomia in patients with diabetes.

Our study also revealed that diabetic mothers had more stillbirths compared to non-diabetic women (p=0.022), where all 5 stillbirths were from the diabetic group (14.81% of pre-GDM group and 4% of GDM group). Our findings are similar to the findings of Wahadi et al. in Saudi Arabia who reported a proportion of stillbirth of 2.9 % in the pre-GDM group, 0.9% in the GDMs and 0.9 % in the group without DM (17). Similar results were from Eshatu et al. who revealed that still birth is a major complication of diabetes in pregnancy (5). Macrosomia was observed in 19.23% deliveries from diabetes mothers compared to only 3.85% deliveries from non-diabetes mothers (p=0.004). The results of our study are in accordance with those from Eshetu et al. (5) and those from the study done by Karasneh (21). Most authors agree that macrosomia is partly related to maternal glucose management, even if some variation in incidence may be attributed to definition (22).

Our results revealed that babies from diabetic women had hypoglycemia (26.92%) as those from non-diabetic women (5.77%).

The current study found no differences in the gestational age at delivery among diabetic and non-diabetic groups. Bodmer-Roy et al. reported the same finding (23). Our results are different from those reported by Nayak et al. where diabetic patients delivered at a lower gestational age (24). The same findings that are different from our results were reported from other previously done studies (5,16,19,25).

The results of analysis in our study showed that there is no difference in the neonatal admission of newborns from women with diabetes and newborns from women without diabetes. Bodmer-Roy found the same results where there was no difference in neonatal admissions in NICU among babies born from mother classified diabetic and those classified non-diabetic according to the International Association of Diabetes and Pregnancy Study Groups (23). Our results are different from the results from the study by O'Sullivan who reported that babies born from diabetic mothers have increased risk of being admitted in NICU (23). Our findings are different from those reported by Nayak et al. in their study where newborns from diabetic women more admitted in NICU for >24h (24). Our finding was also different from the results from the other previously done studies (5). The variation of results may be due to differences in strategies used to manage diabetic pregnant mothers.

Generally, diabetes mother who were aged >35 years were 2.9 folds to have a maternal complication as those aged less than 35 years and this result is similar to that from Wang et al. in China (26).

CONCLUSION

The study identified among diabetic mothers, pregnancy induced hypertension (21.15%) polyhydramnios (11.54%) as adverse maternal outcomes, and macrosomia (19.23%), hypoglycemia (26.92%), Jaundice (25.00%) and stillbirths (9.62%) as adverse fetal outcomes among diabetes mothers delivering at CHUK. Diabetes mother who were aged >35 years were 2.9 folds to have maternal complications as mothers aged less than 35.

Therefore, we recommend enhancing counselling of pregnant diabetic mothers on diabetes mellitus control to prevent maternal and fetal complications and educate the general population on diabetes prevention behaviors.

STUDY LIMITATIONS

The current study has some limitations. Our study has a retrospective design, was done in one hospital and has a small sample size. A country wide study with a long study period will be more informative.

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ANNEXES

DATA COLLECTION TOOL

Study title: Obstetrical and perinatal Outcomes and associated factors among diabetic mothers delivered at CHUK.

I. Sociodemographic characteristics of the participants:

Age in years: …….

Occupation: Employed □ Unemployed □

Marital status: Married □ Unmarried □

BMI: Normal □ Overweight □ Class 1 obesity □ Class 2 obesity □

Obstetrical history:

Parity: primiparous □ multiparous □ History of IUFD □History of macrosomia or LGA□

History of abortion: Yes □ No □

Medical history: Hypertension □ chronic kidney disease □

II. Diabetes mellitus status (DM)

With DM: Yes □ No □

If yes:

Gestational Diabetes mellitus (GDM) □

Type I pregestational Diabetes Mellitus (PDM), □

Types II pregestational Diabetes Mellitus (PDM), □

Glycated Hemoglobin at admission: …..%

Complications of diabetes for PDM:

Vasculopathy yes □ no□

Nephropathy yes □ no□

Antenatal treatment:

Diet only □

Metformin only □

Insulin only □

Insulin + Metformin □

Duration of treatment in months: ……..

III. Maternal outcome:

Onset of labor: Spontaneous □ Induced□

Gestational age at time of delivery: Preterm □ Term□

Mode delivery: Spontaneous vaginal delivery □ Instrumental delivery □ Cesarean section□

Types of C/S: Emergency C/S □ Elective CS□

Maternal complication: yes □ no□

If yes:

- Pregnancy Induced Hypertension (PIH) □
- Polyhydramnios □
- Traumatize labor □
- Obstructed labor □

IV. Adverse fetal outcomes: yes □ no□

If yes:

- Macrosomia□
- Preterm□
- Low birth weight□
- Respiratory Distress Syndrome (RDS)□
- Hypoglycemia□
- Stillbirth□
- Jaundice□
- Birth injury□
- NICU admission□
- Poor Apgar score 5th min□

UNIVERSITY of RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 21st /March /2022

Dr Irambona Isidore
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 225/CMHS IRB/2022

Your Project Title ***"Obstetrical and perinatal Outcomes, and associated factors among diabetic mothers delivered at Centre Kigali University teaching Hospital (CHUK)"*** has been evaluated by CMHS Institutional Review Board.

		Involved in the decision		
			No (Reason)	
Name of Members	**Institute**	Yes	**Absent**	**Withdrawn from the proceeding**
Prof Kato J. Njunwa	UR-CMHS	X		
Dr Stefan Jansen	UR-CMHS	X		
Prof Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Prof Gishoma Darius	UR-CMHS	X		
Prof Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 18th March 2022, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.

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