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Original Research Article

Assessment of Gestational Diabetes Mellitus (GDM) among Pregnant Women with and Without PCOS

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Abstract:

Introduction: Pregnant women diagnosed with polycystic ovarian syndrome (PCOS) have a higher chance of acquiring gestational diabetes mellitus (GDM). This will have deleterious effects on outcome of mother of the foetus. The current research aimed to assess the risk of gestational diabetes mellitus in pregnant women with and without polycystic ovarian syndrome.

Material and Methods: This prospective study included a total of 172 pregnant women aged above 18 years attending antenatal OPD at Maheshwara Medical College and Hospital. Among the cases 86 women were diagnosed with polycystic ovary syndrome (PCOS) and remaining pregnant women without PCOS were included as control subjects. Information on prior gestational diabetes, abortion history, congenital defects, and history of delivering large-for-gestational-age infants was gathered and analysed.

Results: The occurrence of premature births was seen in 5.82% and 1.16% of cases, while polyhydramnios was present in 34.88% and 5.82% of cases. Additionally, abnormal deliveries were recorded in 2.32% of cases alone. Furthermore, the use of intrauterine devices (IUDs) was seen in 5.82% of the cases and 1.16% of the control participants. A statistically significant association ($P<0.05$) was seen between the technique of delivery, preterm births, and polyhydramnios.

Conclusion: The early prevention and timely detection of gestational diabetes mellitus (GDM) may be accomplished via clinical efforts that prioritise teaching patients with polycystic ovary syndrome (PCOS) of developing GDM in pregnancy and advocating strict dietary restriction and early screening test.

Keywords: Gestational Diabetes Mellitus, Polycystic Ovary Syndrome, Pregnancy, Fetomaternal Outcome.

Introduction

Gestational diabetes mellitus (GDM) is any degree of glucose intolerance that begins during pregnancy, perhaps due to excessive glucose metabolism alterations [1, 2]. GDM is the major cause of fetomaternal morbidity and death and poses short- and long-term risks to mothers and children [3-6]. The worldwide frequency of GDM was 5.40-14.80% [7-9].

Chronic anovulation, hyperandrogenism, and characteristic ovarian morphologic alterations characterise poly cystic ovary syndrome (PCOS), one of the most frequent endocrine diseases in reproductive-age women [10-13]. Due to placental synthesis of diabetogenic hormones, pregnancy causes increasing insulin resistance that limits glucose entry into maternal cells and maintains fuel for the foetus [14]. Thus, PCOS may worsen pregnancy's diabetogenic state by causing androgen excess, dyslipidaemia, or low-grade chronic inflammation due to insulin resistance and obesity [15]. Oxidative stress increases in PCOS women due to metabolic abnormalities. Thus, clinical and biochemical traits related to trophoblast invasion and placentation impact pregnancy problems [16,17].

Women with polycystic ovary syndrome (PCOS) have been linked in multiple studies to an elevated risk of developing gestational diabetes mellitus (GDM) and potentially to unfavourable pregnancy outcomes (18-20). The current study was conducted in order to compare the risk of gestational diabetes mellitus between pregnant women with and without polycystic ovary syndrome.

Material and Methods

The present cohort study was conducted in the Department of Obstetrics and gynaecology at Maheshwara Medical College and Hospital, Isnapur from May 20122 to December 2023. A total of 172 pregnant women diagnosed with PCOS attending antenatal OPD were recruited. Age and

number matched healthy pregnant women were recruited as control healthy subjects. Pregnant women above 18 years of age, admitted before 20 weeks of gestation and willing to participate were included. Women with twin pregnancies, diabetes mellitus, with systemic disease and chronic illness and not willing to participate were excluded. Written informed consent was obtained from the study participants and study protocol was approved by institutional ethics committee.

All participants were undergone detailed clinical examination. The laboratory investigations including FBS, PLBS, OGTT and complete hemogram was performed. The obstetric history including previous history of gestational diabetes, history of abortions, congenital anomalies and history of large for gestational age babies were collected. OGTT is performed at 16 weeks and 28 weeks and according to the reports of pregnant women diagnosed with GDM. The collected data was analysed by using SPSS version 22.0. Categorical variables were represented in frequency and percentages. Descriptive statistics was used to analyse qualitative variables. Independent sample t-test and chi square test was used to assess association and categorical variables. $P<0.05$ was considered as statistically significant outcome.

Results

Table 1: Socio-demographic details of study participants.

Demographic data	Cases (n=86)		Controls (n=86)		Chi-square value	p-value
	Frequency	Percentage	Frequency	Percentage		
Age (In years)						
18-24	34	39.53%	45	52.32%	2.082	1.644
24-30	42	48.83%	29	33.72%		
Above 30	10	11.62%	12	13.95%		
Educational status						
Primary	14	16.27%	18	20.93%	0.726	0.218
Higher secondary	26	30.23%	15	17.44%		
Intermediate	22	25.58%	26	30.23%		
Graduation & above	16	18.60%	20	23.25%		
Illiterate	08	9.30%	07	8.13%		
Socioeconomic status						
BMI (kg/m^2)	26.88±3.81		25.48±2.84		-	0.001

Table 2: Menstrual and obstetric history of study participants

Demographic data	Cases		Controls		Chi-square value	p-value
	Frequency	Percentage	Frequency	Percentage		
Status of menstrual cycle						
Regular	20	23.26%	78	90.70%	17.07	0.040
Irregular	66	76.74%	08	9.30%		
Dysmenorrhea						
Present	18	20.93%	75	87.20%	26.58	0.001
Absent	68	79.07%	11	12.80%		
Family history of diabetes mellitus						
Positive	45	52.32%	18	20.93%	10.34	0.0167
Negative	41	47.68%	68	79.07%		
Family history of Hypertension						
Present	22	25.58%	10	11.62%	0.78	0.0892
Absent	64	74.42%	76	88.38%		
Gravida						
Primi	63	73.25%	48	55.81%	4.65	0.083
Multi	23	26.74%	38	44.18%		
History of previous abortions						
Yes	32	37.20%	18	20.93%	8.18	1.12
No	54	62.80%	68	79.07%		
Gestational age (In weeks)	12.32±3.65		14.34±2.87		-	0.940

Table 3: Association of study groups with study variables

Demographic data	Cases		Controls		Chi-square value	p-value
	Frequency	Percentage	Frequency	Percentage		
OGTT						
Negative	66	76.74%	81	94.18%	3.518	0.001
Positive	20	23.26%	05	5.82%		
TSH						
Normal	74	86.04%	03	3.48%	1.467	0.884
Elevated	12	13.96%	83	96.52%		
PIH						
Present	22	25.58%	05	94.18%	2.286	0.652
Absent	64	74.42%	81	94.18%		

Table 4: Details of foetal outcome among study groups

Demographic data	Cases		Controls		Chi-square value	p-value
	Frequency	Percentage	Frequency	Percentage		
Mode of delivery						
Normal	54	62.80%	57	66.28%	10.48	0.041
LSCS	31	36.04%	26	30.24%		
Forceps	01	1.16%	03	3.48%		
Preterm deliveries						
Present	05	5.82%	01	1.16%	1.238	0.039
Absent	81	94.18%	85	98.84%		
Polyhydramnios						
Present	30	34.88%	05	5.82%	3.094	0.022
Absent	56	65.12%	81	94.18%		
Weight of the baby						
Under weight	28	32.55%	06	6.98%	11.903	0.001
More than normal weight	01	1.16%	04	4.65%		
Normal	57	66.28%	76	88.38%		
Anomalous deliveries						
Present	02	2.32%	-	-	0.014	0.896
Absent	84	97.68%	86	100%		
IUD						
Present	05	5.82%	01	1.16%	0.325	1.039
Absent	81	94.18%	85	98.84%		

Discussion

The age factor is a significant determinant in the development of gestational diabetes. The majority of the women giving birth in the study group were between the ages of 24 and 30 (48.83%), whereas in the control group, themajority were between the ages of 18 and 24 (52.32%) (Table 1).

Multiple studies have shown that body mass index (BMI) is strongly correlated and a crucial risk factor for the development of gestational diabetes mellitus (GDM) in individuals with polycystic ovary syndrome (PCOS) [21-25]. Similarly, the average BMI was 26.88 kg/m2 in cases and 25.48 kg/m2 in control participants, indicating a substantial correlation (Table 1).

The irregular menstrual cycles were observed in 76.74% of cases and in 9.30% of controls. Dysmenorrhea was seen in 20.93% of cases and 87.20% of controls. Positive family history for diabetes mellitus and hypertension was observed in 52.35% and 25.58% of cases respectively. Majority participants were primi gravida in both cases and controls. 37.20% of cases had reported previous history of abortions, whereas 20.93% of controls reported abortions. The mean gestational age was 12.32 weeks in cases and 14.34 weeks in control subjects.

The association of menstrual cycle, dysmenorrhea, and history of diabetes was statistically significant (P<0.05) (Table 2). The GDM was observed in 23.36% of cases, elevated TSH levels was observe in 13.96%and PIH was seen in 25.58% of pregnant women with PCOS. There significant association of OGTT between study groups, whereas TSH and

PIH was not significant between the groups (Table 3). The mode of delivery was normal vaginal delivery in 62. 80% & 66.28%, LSCS in 36.04% & 30.24% and by use of forceps in 1.16% & 3.48%

of cases and control subjects respectively (Table 4). According to o Wang C et al. and kijmanawat A et al. the occurrence of GDM inpregnant women aged 25-40 roses progressively with their age [26,27].

According to Iwama N et al. and Gou BH et al. have shown that women with polycystic ovary syndrome (PCOS) who are over 30 years old had a higher likelihood of developing gestational diabetes compared to pregnant women aged 20-30 years [27,28]. According to Manoharan V et al. (2020), Palomba S et al. (2015), and Weerakiet S et al., the occurrence of preeclampsia, preterm delivery, and polyhydramnios was notably greater in the group with GDM compared to the non-GDM and control groups [29-31].

These findings align with the results of the current research. Moreover, there exists a robust association between PCOS and premature delivery. Similarly, our study observed premature births in 5.82% and 1.16% of cases, polyhydramnios in 34.88% and 5.82% of cases, and assisted deliveries in 2.32% of cases alone. In addition, intrauterine death IUD) use was seen in 5.82% of cases and 1.16% of control subjects. The correlation between the method of delivery, premature births, and polyhydramnios was shown to be statistically significant ($P<0.05$) (Table 4). Thus, GDM is a significant risk factor that amplifies negative pregnancy outcomes in women who are pregnant and have PCOS. To mitigate negative pregnancy outcomes, it is crucial to promptly identify and diagnose any potential risk factors actively engage in preventive measures, and provide appropriate treatment. A meta-analysis by Yan Q et al., and Yu Qiu et al., suggests that gestational diabetes mellitus was common among women with polycystic ovary syndrome [32,33].

A study by Yang SW et al., that PCOS was associated with an increased risk for GDM of slightly lower than twofold [34]. A study conducted by Li X et al. on a sample of 196 women with polycystic ovary syndrome (PCOS) revealed that 23.98% of the participants had gestational diabetes mellitus (GDM). Age over 30 years, BMI more than 24kg/m2, insulin resistance index above 22.69, testosterone levels above 2.85nmol/L, and sex hormone binding protein levels below 64.22nmol/L were identified as major independent risk factors for the development of gestational diabetes mellitus (GDM) in women with polycystic ovary syndrome (PCOS). The occurrence of preeclampsia, early birth, premature rupture of membranes, polyhydramnios, andpostpartum haemorrhage was substantially greater in the group with gestational diabetes mellitus (GDM) compared to the group without GDM ($P<0.05$) [35]. The current research is limited by a small sample size. Additional multicentric studies are needed to evaluate the influence of infertility therapy, glucoregulatory medications, and other variables on the risk ofgestational diabetes mellitus (GDM) during preconception care.

Conclusion

GDM is more common in PCOS individuals during pregnancy. The independent risk factors for GDM in PCOS patients and critical predictors to diagnose GDM before pregnancy include characteristics such as older age, greater BMI, higher HOMA-IR, androstenedione, and low SHBG. Concurrently, it is crucial to prioritise addressing the negative impacts of GDM on the outcomes for both mothers and infants. Early prevention and prompt identification of gestational diabetes mellitus (GDM) may be achieved by clinical work that emphasises the need of educating PCOS patients about pre-pregnancy information and management and control strategies during post-pregnancy checkups.

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