American Journal of Medical Sciences and Medicine, 2020, Vol. 8, No. 5, 187-195
Available online at http://pubs.sciepub.com/ajmsm/8/5/4
Published by Science and Education Publishing
DOI:10.12691/ajmsm-8-5-4

The Prevalence and Determinants of GDM among Pregnant Women's in Obstetric Clinics at MCH Makkah City 2019

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Received September 09, 2020; Revised October 10, 2020; Accepted October 19, 2020

Abstract Gestational diabetes mellitus (GDM) used to be defined as any degree of glucose intolerance with onset or first recognition during pregnancy. Gestational Diabetes Mellitus (GDM) is the most common metabolic disorder during pregnancy. It is associated with maternal and fetal complications. Screening for GDM and its risk factors is essential for the early diagnosis and management. Recently, the definition has evolved to distinguish women whose condition is a transient manifestation of pregnancy-related insulin resistance from those with probable preexisting diabetes that is first recognized during pregnancy. The physiological and hormonal change during pregnancy can lead to increase insulin resistance and production of glucose, if pancreas cannot secrete sufficient insulin to maintain blood glucose can cause impaired glucose tolerance or gestational diabetes. **Aim of the study:** This study aimed to evaluate the prevalence of GDM among pregnant women's in the obstetric clinics in MCH at Makkah city. **Methodology:** analytic cross sectional study was conducted among (147) pregnant women who attend obstetric clinics in the one-month using the simple has been random technique using random table generator. Maternal and children's hospital is the biggest hospital in Makkah and has 3 clinic per day. **Results:** A total of (170) participated in the study. Regarding age of these Only(46.5%)of the participated were(>35)years, the weight(current) the data ranged from(40to136)by mean +SD(72.905±16.167). While the weight before pregnancy the data ranged from (39to1727)by mean +SD(67.985±15.082). The age a significant relation between diabetic mellitus and age were P-value=0.001and X2(8.860) increase in >35years answer YES were(71.4%). Gravida show a significant relation between diabetic mellitus were P-value=0.036 and X2(10.255) increase in more than 4 answer YES were (57.1%). the gravida/para/abortus (GPA) results show a significant relation between diabetic mellitus and GPA were P-value=0.026 and X2(11.008) increase in zero answer NO were (64.7%). **Conclusion:** The prevalence of of GDM among pregnant women's in obstetric clinics at MCH Makkah city 2019 was high. Previous history of GDM, antenatal family history of diabetes, low physical activity, overweight and/or obesity and inadequate dietary diversity were significantly associated with GDM. Routine screening of pregnant women and healthy lifestyle are strongly recommended.

Keywords: *prevalence, determinants. Gestational, diabetes, mellitus, pregnant, women's*

Cite This Article: Ahmed Saleh Alghamdi, and Ebtesam Bakheet Allugmani, "The Prevalence and Determinants of GDM among Pregnant Women's in Obstetric Clinics at MCH Makkah City 2019." *American Journal of Medical Sciences and Medicine*, vol. 8, no. 5 (2020): 187-195. doi: 10.12691/ajmsm-8-5-4.

1. Introduction

1.1. Background

The meaning of GDM is any level of glucose intolerance that previously perceived through pregnancy [1]. The term Gestational diabetes mellitus is utilized when diabetes mellitus is analyzed in the second trimester of pregnancy while it is named clear diabetes mellitus when analyzed in the early pregnancy [2] The commonness in the USA is 6% to 7% [3]

In Kingdom of Saudi Arabia the prevalence is assessed 12.5% as indicated by the research's distributed in 2000 [4], and pervasiveness increment up to 22% in 2015. The check and test for GDM is widespread, and all ladies ought to do the oral glucose resilience test from 24weeks to 28 weeks [5]. GDM is one of the Common and widespread ailments during pregnancy and has numerous harmful and dangerous antagonistic consequences for both mother and embryo if not treated well [6]. The danger factor for GDM is BMI > 30, past history of GDM, family background of type2 DM, age >25 years, past distorted infant or old age for gestational age [2], regardless of whether there no danger factors or low risk the grounds

that there is 20% have positive OGTT and have generally safe elements for GDM. Up to 85% reaction to medical, healthful treatment and 15% just need drug administration to standardize the glucose level [7].

1.2. Rationale

The prevalence of GDM is increasing worldwide due to an increasing prevalence of obesity, and prevalence of GDM is near to prevalence of type2 DM because it has the same pathophysiology and risk factor. Decrease risk factor prepregnancy like Wight loss is essential to decrease the incidence of GDM. Uncontrolled GDM can cause many adverse effects on the mother like preeclampsia, cesarean section, pre-term delivery, and polyhydramnios. Also hyperglycemia can cause many complications to the fetus like macrosomia, shoulder dystocia, neonatal hypoglycemia, neonatal hyperbilirubinemia, and need for intensive care unit. Also there is no published research about GDM in Makah city .

1.3. Aim of the Study

To evaluate the prevalence of GDM among pregnant women's in the obstetric clinics at MCH Makkah city.

1.4. Objectives

- To estimate the prevalence of GDM among pregnant women's in obstetric clinics at MCH Makkah city.
- Also, to identify the determents of GDM among pregnant women's in obstetric clinics at MCH Makkah city.

2. Literature Review

2.1. Prevalence of Gestational Diabetes Mellitus (GDM)

Gestational Diabetes Mellitus (GDM) is characterized as glucose intolerance that can be recognized during pregnancy, typically, happening following the 24th seven day stretch of gestation. [1] It is related with grave results for the pregnant females as well as for the embryo and after delivery to the neonates. It is essential to perceive and treat the issue in early stages in light of the fact that GDM related complications in mother and fetus are mostly preventable. [8]

One cause's for the rise in GDM prevalence is that it doesn't have exceptionally clear side effects; In addition to, inordinate pee and exhaustion, urinary tract infections (UTIs), queasiness and regurgitating are probably going to be available. [9]

In the event that it isn't analyzed and treated, at that point gestational hyperglycemia may make different intricacies the lady, for example, premature birth, toxemia, preterm labor, placenta praevia, vaginal tingling, UTI, puerperal sepsis, and pyelonephritis. [10]

The pattern of prevalence of GDM has eminent provincial and ethnic contrasts. Asian inhabitants are thought of at higher risk than white populations. [11], rise maternal age and obesity, corpulence, prior pregnancy GDM, and case history of DM are considered few dominant risk factors for the progress of GDM [12].

The prevalence of GDM from eight to 19% in Saudi Arabia. in addition to, a large- scope search concentrate in Riyadh (capital of SA) detailed that SA has the most elevated prevalence of GDM (24%) in the world.10 In the current search, we intended to discover the pervasiveness and related danger components of GDM among females went to antenatal facility during the year 2015, at King Abdul-Aziz University Hospital (KAUH), Jeddah, SA, he pervasiveness of GDM in Saudi ladies was accounted for beforehand as 12.5% [13]. As of late, Al-Rubeaan et al 25 announced a higher pervasiveness of GDM among Saudi ladies of 36.6%, while applying partial IADPSG criteria [14].

Gestational diabetes mellitus (GDM) is characterized as any level of glucose intolerance with the beginning or first acknowledgment during pregnancy. [1,2] Previously, the prevalence of GDM was accounted for range from 1 to 14%, depending on the population research the signs and symptomatic tests employed. [3,4]

In addition to, the commonness of GDM has expanded rise since 2010 by 2-to 3-fold, going from [15] to 53.4%.5–15 This augmentation is principally because of the selection of the new models proposed by the International Association of Diabetes and Pregnancy Study Groups (IADPSG) for the screening and diagnosis of GDM. The IADPSG suggests widespread screening for GDM and requires a solitary glucose esteem over the cut-off worth (rather than two) during the OGTT for analysis. Lower cut-off qualities are praised for fasting and 2-hour glucose. [6]

2.2. Adverse Outcome of Gestational Diabetes Mellitus

GDM has been related with consequences maternal and infant sequelae [16]. The Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) research show significant associations between adverse pregnancy results and more significant levels of maternal glucose, with no characterized levels past which the danger increased.18 Thus, early analysis of GDM is basic to decrease maternal and fetal morbidity to take into account ensuing endeavors to forestall or defer the beginning of type 2 diabetes. There have been no investigations looking at the pervasiveness of GDM in Saudi ladies. [17].

This prospective study was undertaken to prevalence and determinants of GDM among pregnant women's in obstetric clinics at MCH Makkah city 2019.

3. Methodology

3.1. Study Design

Analytic cross sectional study

3.2. Study Area

Makkah is located in western region in Saudi Arabia. It is the holy city for all Muslims, which contain the masjid al haram and al ka'abah. It is one of the most important

and populated city. In addition it have multiple nationalities and different socioeconomic status. The Ministry Of Health have two hospitals provide the care for pregnant women's and their children's. The first on is MCH and second is Heraa hospital, and Security Force has one hospital, study location Maternal and children's hospital is the biggest hospital in makkah and has 3 clinic per day .

3.3. Study Population

On pregnant women attending obstetric clinics from 1/9/209 to 30/9/2019(1month).

3.4. Eligibility Criteria

Inclusion criteria:

- All pregnant women's in second and third trimester.
- All nationalities.
- Attended obstetric clinics**.**

Exclusion criteria:

- First trimester.
- Already diabetic patient .(type 1 and type 2)
- Less than 18 years age old.

3.5. Sample Size

The sample size calculated from http://www.raosoft.com/samplesize.html. And the sample size is (147).

The total number of population estimated (700) patient, The prevalence of GDM: 22%, Confidence level(90%), error (5%).

3.6. Sampling Technique

The sample has been collect by simple random technique using random table, by using systematic sampling random as dividing the total population by the required sample size; (174) generator from https://stattrek.com/statistics/random-numbergenerator. aspx #error

147 Random Numbers

309 441 371 068 279 531 102 361 284 142 568 690 697 675 042 540 446 543 252 426 416
633 682 020 608 244 449 349 135 591 623 199 583 645 132 271 554 035 563 379 045 346
329 008 458 693 503 558 207 561 012 630 177 137 443 038 368 262 210 367 596 095 383
217 344 663 593 289 314 053 324 396 506 364 090 211 219 196 264 576 667 065 473 648
638 154 204 241 129 466 670 570 356 112 144 421 105 167 353 307 075 256 598 600 267
382 551 229 494 214 539 080 428 082 234 152 398 172 479 259 404 483 431 588 117 316
419 439 566 184 114 510 536 274 359 618 027 585 311 247 254 232 299 097 189 286 509

Specs: This table of 147 random numbers was produced according to the following specifications: Numbers were randomly selected from within the range of 1 to 700. Duplicate numbers were not allowed. This table was generated on 5/28/2019.

3.7. Data Collection Tool

The data has been collect from participants after taking consent by interview

Questionnaire: The questionnaire has been valid and filled by 3 consultants . First section: demographic data. Second section: Risk factor of GDM. Three Section: Result of OGTT.

(If the OGTT not done, the researcher has been ask the laboratory department to do it).

3.8. Data Collection Technique

The researcher has been visits the selected PHC after getting the approval from the ministry of health. The researcher has been obtained permission from primary health care director and pregnant women's. She has been explained the purpose of the study to all pregnant women's attending to the pregnant women's clinic. The pregnant women's has been interviewed by the researcher herself inside the clinic. The data will collect through one month from 1/9/2019 to 30/9/2019.

Demographic data	Name				
	Nationality	Saudi	Non Saudi		
	Age	18-25	25-30	30-35	>35
	Gravida	parity			
	Education level	Not education	Undergraduate Education	Postgraduate education	
	Activity	No	150m/week	>150m/week	

Risk factor of GDM	BMI*	<18.5	18.5-24.9	25-29.9	30-34.9	>35
	HTN	yes	No	Unknown		
	Previous history of GDM	yes	No	Unknown		
	Family history of DM		of GDM	of GDM		
	Previous malformed baby	yes	No	Unknown		
	Previous yes No Unknown macrocosmic baby	yes	No	Unknown		
	History of abortion	yes	No	Unknown		
	History of stillbirth	yes	No	Unknown		
	History of PCOS	yes	No	Unknown		
	Multiple gestation	yes	No	Unknown		
	Wight of baby	Below normal	Norma	Large for gestational age		
	Polyhydrmnios	yes	No	Unknown		
Result of OGTT	Fasting	1hour	2hour			

*Pre-pregnancy BMI

If the OGTT not done , I will ask the laboratory department to do it.

3.9. Study Variables

Dependent:

- The result of GDM is positive or negative.

Independent:

- age, BMI, Previous history of GDM, HTN, Family history of DM, Previous malformed baby, Previous macrosomic baby, Multiple gestation, Wight of baby, Polyhydrmnios.

3.10. Data Entry and Analysis

Data has been collected and verified by hand then coded before entry to personal computer. Data entry and analysis has been carried out using the statistical program for social sciences (SPSS) version 24. P-value will considered statistically significance if it is < 0.05.

3.11. Pilot Study

A pilot study has been conducted in heraa hospital 10% of the sample with full methodology and analysis has been done in the result not included in main study.

3.12. Ethical Considerations

I well take approval and consent from

- Research committee approval.
- Higher authority approval.
- Hospital director of MCH.
- Head of obstetrics and gynecology department.
- OPD director.
- Laboratory department.
- Medical record.
- Written or verbal consent for all participants.

All information will keep confidential and will not disclose except for the study purpose**.**

3.13. Relevance & Expectations

- The researcher expects from the study, increasing the prevalence of GDM is worldwide due to an increasing prevalence of obesity and low level of adherence to the recommendations.
- The researcher expects from the study, prevalence of GDM is near to prevalence of type2 DM because it has the same pathophysiology and risk factor.
- Uncontrolled GDM can cause many adverse effects on the mother like preeclampsia, cesarean section, pre-term delivery, and polyhydramnios
- The researcher expects from the study increase the awareness about the recommendations hyperglycemia can cause many complications to the fetus like macrosomia, shoulder dystocia, neonatal hypoglycemia, neonatal hyperbilirubinemia, and need for intensive care unit

3.14. Limitations

The researcher expects there may be limitation in time.

3.15. Budget

This study is self-funded.

4. Results

A total of 170 on pregnant women attending obstetric clinics participated in the study in Makkah city 2019.

A total of (170) participated in the study. Regarding age of these Only (46.5%) of the participated were (>35) years, while (22.4%) were (18-25) follow by (18.2%) were (30-35). Regarding the weight (current) the data ranged from (40 to 136) by mean +SD (72.905±16.167). While the weight before pregnancy the data ranged from (39 to 1727) by mean +SD (67.985±15.082).

Regarding the height the data ranged from (1.3-1.79) by mean +SD (1.585±0.073). Regarding the BMI The majority of the participated overweight were (37.6%), follow by normal were (22.4%), but obese (18.2%) while morbid obesity were (17.6%) the data ranged from (16.23-55.88) by mean +SD (29.111±6.756). regarding nationality the majority of the participated were (95.5%) Saudi while (4.1%) non-Saudi. Approximately of participant house wife were (48.2%) and (38.8%) were teacher, while in medical field were (5.3).

Table 1. Distribution of socio-demographic data (age, weight (current), weight before pregnancy, height, BNI, Nationality, Occupation) characteristics among pregnant women's (N = 170)

	N	%
Age		
18-25	38	22.4
25-30	22	12.9
30-35	31	18.2
>35	79	46.5
Weight (current)		
Range	40-136	
Mean±SD	72.905±16.167	
Weight before pregnancy.		
Range	39-1727	
Mean±SD	67.985±15.082	
Height		
Range	1.3-1.79	
Mean±SD	1.585±0.073	
BMI		
Underweight	7	4.1
Normal	38	22.4
Overweight	64	37.6
Obese	31	18.2
Morbid obesity	30	17.6
Range	16.23-55.88	
Mean±SD	29.111±6.756	
Nationality		
Saudi	163	95.9
Non Saudi	7	4.1
Occupation		
House wife	82	48.2
Teacher	66	38.8
Administrative	13	7.6
In medical field	9	5.3

Table 2. Distribution of woman's obstetric history demographic data (gravida/para/abortus (GPA)

	N	%
Gravida		
1	30	17.6
2	16	9.4
3	29	17.1
4	27	15.9
More than 4	68	40.0
GPA		
0	105	61.8
1	37	21.8
2	12	7.1
3	10	5.9
More than 3	6	3.5
Are you pregnant with twins (current pregnancy)		
No	168	98.8
Yes	2	1.2

Regarding the Gravida the majority of the participated a woman's obstetric history to record the number more than 4 were (40%) follow by 1and 3 respectively were (17.6, 17.1%). While GPA the majority of the participated a woman's obstetric history to record the number zero were (61.8%) but the number 1 were (21.8%).

Regarding to you are pregnant with twins (current pregnancy) the majority of woman's answer NO were (98.8%) while YES only were (1.2%).

Table 3. Distribution of pregnant woman history of DM and chronic diseases

	N	%
DM		
No	156	91.8
Yes	14	8.2
chronic diseases		
No	151	89.0
Yes	19	11.2
chronic diseases (type)		
DM	5	26.3
HTN	3	15.8
Hypothyroid	5	26.3
Salts	2	10.5
Asthma	4	21.1

Regarding the DM the majority of the participated recorded NO DM were (91.8%) while YES were (8.2%). While heave chronic diseases the majority answer NO were (89.0) follow by answer YES were (11.2%), while the distribution the type of chronic diseases the DM and Hypothyroid were respectively(26.35,26.3%) follow by Asthma , hypertension and salts were respectively (21.1%, 15.8%, 10.5%).

Table 4. Distribution of Risk factor of Gestational diabetes (GDM)

	N	%
Have you ever had gestational diabetes?		
No	144	84.7
Unknown	6	3.5
Yes	20	11.8
If the answer was yes, how many times did you have gestational diabetes?		
One	10	50.0
Two	5	25.0
Three	4	20.0
Four	1	5.0
Family history		
No	53	31.2
Unknown	12	7.1
Yes	105	61.8
Are there previous birth defects in one of your children?		
No	166	97.6
Yes	4	2.4
Have you ever had a stillbirth after the 28th week?		
No	158	92.9
Yes	12	7.1
Have you ever given birth to a fetus weighing more than 4 kg?		
No	164	96.5
Yes	6	3.5
Have you ever been diagnosed with excess amniotic fluid?		
No	143	84.1
Unknown	18	10.6
Yes	9	5.3
Do you have PCOS?		
No	145	85.3
Unknown	15	8.8
Yes	10	5.9

Risk factor of GDM among all participants, women Have you ever had gestational diabetes most of the women answer NO were (84.7%) follow by YES were (11.8), regarding answers yes the majority of participants one times have gestational diabetes were (50%) while two times and follow by three were (25%, 20%) respectively. While family history of the DM most of the participants answers YES were (61.8%) follow by answers NO were (31.2).

Regarding their previous birth defects in one of your children the majority of participants answers NO were (97.6%) while YES were (2.4%), but have you ever had a stillbirth after the 28th week most of the participants answers NO were (92.9%) while answers YES were (7.1%), while you ever given birth to a fetus weighing more than 4 kg most of participants not given answers NO were (96.5) but answers YES were (3.5%).

Regarding you ever been diagnosed with excess amniotic fluid the majority of the woman answers NO were (84.1%) while unknown were (10.6%) follow by YES were (5.3%), regarding you have Polycystic ovarian syndrome (PCOS) most of the participants answer NO were (85.3%) follow by unknown were (8.8%) but answer NO were (5.9%)

Table 5. Distribution of Result of Oral Glucose Tolerance Test (OGTT) during(challenge test, fasting, 1hour, 2hour, 3hour)

	N	Minimum	Maximum	Mean	SD
50 GRAM GLUCOSE CHALLENGE TEST	157	100.00	140.00	117.57	10.80
100 G OGTT FASTING	27	85.00	115.00	93.63	8.16
1HOUR	27	170.00	200.00	176.44	7.39
2 HOUR	27	140.00	160.00	152.07	4.09
3 HOUR	27	120.00	150.00	131.48	7.47

Oral glucose tolerance test (OGTT) in the 50 Gram Glucose challenge test insulin genic index insulin sensitivity Minimum were (100.00), while Maximum oral were (140.00) but Mean were (117.57) while SD (10.80). While oral glucose tolerance test fasting (OGTT) in the 100 Gram Glucose test insulin sensitivity Minimum were (85.00), while Maximum oral were (115.00) but Mean were (93.63) while SD (8.16).

But after the one hour, 2 hour and 3hour, oral glucose is a screening test for gestational diabetes that measures serum glucose concentration after a 100-g oral glucose load. Insulin sensitivity Minimum were respectively (170.00, 140.00, 120.00), while Maximum in the one hour, 2 hour and 3hour were respectively (200.00, 160.00, 150.00) but Mean in the one hour, 2 hour and 3hour were respectively (176.44, 152.07, 131.48) while SD in the one hour, 2 hour and 3hour were respectively (7.39, 4.09, 7.47).

Table 6. Description of the relation between Socio-demographic data and diabetic mellitus (DM)

		DM						Chi-square	
		No		Yes		Total			
		N	%	N	%	N	%	X^2	P-value
Age	18-25	38	24.4%	0	0.0%	38	22.4%	8.860	0.031*
	25-30	21	13.5%	1	7.1%	22	12.9%		
	30-35	28	17.9%	3	21.4%	31	18.2%		
	>35	69	44.2%	10	71.4%	79	46.5%		
Nationality	Saudi	150	96.2%	13	92.9%	163	95.9%	0.298	0.585
	Non Saudi	6	3.8%	1	7.1%	7	4.1%		
Occupation	House wife	78	50.0%	4	28.6%	82	48.2%	4.222	0.239
	Teacher	60	38.5%	6	42.9%	66	38.8%		
	Administrative	10	6.4%	3	21.4%	13	7.6%		
	In medical field	8	5.1%	1	7.1%	9	5.3%		
BMI	Underweight	7	4.5%	0	0.0%	7	4.1%	4.071	0.397
	Normal	37	23.7%	1	7.1%	38	22.4%		
	Overweight	57	36.5%	7	50.0%	64	37.6%		
	Obese	28	17.9%	3	21.4%	31	18.2%		
	Morbid obesity	27	17.3%	3	21.4%	30	17.6%		
Gravida	1	30	19.2%	0	0.0%	30	17.6%	10.255	0.036*
	2	16	10.3%	0	0.0%	16	9.4%		
	3	27	17.3%	2	14.3%	29	17.1%		
	4	23	14.7%	4	28.6%	27	15.9%		
	More than 4	60	38.5%	8	57.1%	68	40.0%		
GPA	0	101	64.7%	4	28.6%	105	61.8%	11.008	0.026*
	1	33	21.2%	4	28.6%	37	21.8%		
	2	10	6.4%	2	14.3%	12	7.1%		
	3	7	4.5%	3	21.4%	10	5.9%		
	More than 3	5	3.2%	1	7.1%	6	3.5%		

Regarding age, results show a significant relation between diabetic mellitus and age were P-value=0.001and X2 (8.860) increase in >35years answer YES were (71.4%) follow by NO were (44.2%).

Regarding the nationality, occupation, BMI, results show no significant relation between diabetic mellitus and nationality, occupation, BMI were respectively (P-value=0.585, 0.239, 0.397) and X2 were respectively (0.298, 4.222, 4.071).

Regarding Gravida results show a significant relation between diabetic mellitus and Gravida were P-value=0.036 and X2(10.255) increase in more than 4 answer YES were (57.1%) follow by NO were (38.5%).

Regarding the gravida/para/abortus (GPA) results show a significant relation between diabetic mellitus and GPA were P-value=0.026 and X2(11.008) increase in zero answer NO were (64.7%) follow by answer YES in zero and one were(28.6%).

Table 7. Description of the Multi Logistic Regression between Gestational diabetes(GDM) as(depending variables)and independent variables (BMI, age, Gravida, GPA, Constant)

Logistic regression	B	S.E.	Wald	P-value	Odd	95% C.I. for Odd ratio	
						Lower	Upper
BMI	-0.023	0.046	0.262	0.609	0.977	0.893	1.068
Age	0.645	0.423	2.323	0.127	1.906	0.832	4.370
Gravida	0.154	0.340	0.204	0.652	1.166	0.598	2.272
GPA	0.461	0.241	3.654	0.048*	1.586	1.012	2.544
Constant	-4.929	1.857	7.046	0.008	0.007		

Regarding history of BMI no significant negative of BMI and Gestational diabetes were P-value=0.609, and (Odd = 0.977, 95% CI = 0.893-1.068). while (B=-0.023, S.E.=0.046 and Wald=0.262).

Regarding age no significant Positive of age and Gestational diabetes were P-value=0.127, and (Odd = 1.906, 95%CI = 0.832-4.370). while (B=0.645, S.E.= 0.423 and Wald=2.323).

Regarding Gravida no significant Positive affect of Gravida and Gestational diabetes were P-value=0.652, and (Odd = 1.166, 95%CI = 0.598-2.272). while (B=0.154, S.E.= 0.340 and Wald=0.204).

Regarding GPA a significant Positive affect of GPA and Gestational diabetes were P-value=0.048, and (Odd = 1.586, 95%CI = 1.012-2.544), while (B=0.461, S.E.= 0.241 and Wald=3.654.

Regarding constant no significant Negative affect of constant and Gestational diabetes were P-value=0.008, and (Odd = 0.007). while(B=-4.929, S.E.= 1.857 and Wald=7.046.

5. Discussion

This analytic cross sectional study involved a relatively large number of pregnant women (N=170), including pregnant women in the second and three trimesters of pregnancy.

Similar findings were reported in cross-sectional study involved a relatively large number of pregnant women in the second pregnancy, including pregnant women in three trimesters of pregnancy: early pregnancy, mid-pregnancy, and late-stage pregnancy. The estimated prevalence of GDM among all participants, women in the first pregnancy, and women in the second pregnancy were 3.7%, 3.4%, and 4.6%, respectively. The overall prevalence of GDM was slightly lower than in a previous study conducted in 18 Chinese cities with an incidence of GDM at 4.3% [18].

Regarding socio-demographic data age of these Only (46.5%) of the participated were (>35) years, and weight (current) the data ranged from (40 to 136) by mean +SD (72.905±16.167). While the weight before pregnancy the data ranged from (39 to 1727) by mean +SD (67.985±15.082). The height the data ranged from (1.3-1.79) by mean +SD (1.585±0.073). About the BMI The majority of the participated overweight were (37.6%) the data ranged from (16.23-55.88) by mean +SD (29.111±6.756), regarding nationality the majority of the participated were (95.5%) Saudi. Approximately of participant house wife were (48.2%). (See Table 1)

Those populations might be strongly influenced by chronic diseases compared with those in higher socioeconomic status areas [19]. However, second pregnancy was not significantly associated with an increased prevalence of GDM. This result is inconsistent with a previous study in the United States showed that GDM prevalence increased with the types of the chronic diseases [20].

The majority of the participated a woman's obstetric history to record the number more than 4 were (40%), while GPA the majority of the participated a woman's obstetric history to record the number zero were (61.8%) but the number 1 were (21.8%). Also in our study the heave chronic diseases the majority answer NO were (89.0) follow by answer YES were(11.2%), while the distribution the type of chronic diseases the DM and Hypothyroid were respectively(26.35,26.3%) follow by Asthma, hypertension and salts were respectively (21.1%, 15.8%, 10.5%). (See Table 2 and Table 3)

The study showed that having a family history of diabetes mellitus was a significant factor for an increased risk for GDM. family history of the DM most of the participants answers YES were(61.8%) follow by answers NO were(31.2). The finding was consistent with Carr DB et al. study in the US [21], and Iran [22,23]. (See Table 4)

OGTT, oral glucose tolerance test; in the 50 Gram Glucose challenge test, after one hour oral glucose challenge test [OGTT] is a screening test for gestational diabetes that measures serum glucose concentration 1 hour after a 100-g fasting load.

In our study oral glucose tolerance test(OGTT) in the 50 Gram Glucose challenge test insulin genic index insulin sensitivity Minimum were (100.00), while Maximum oral were (140.00) but Mean were(117.57) while SD (10.80). While oral glucose tolerance test fasting (OGTT) in the 100 Gram Glucose test insulin sensitivity Minimum were(85.00), while Maximum oral were(115.00) but Mean were(93.63) while SD (8.16). (See Table 5). Similar findings the high prevalence of GDM in Indian population as compared to western countries can be due to trend toward older maternal age, decrease in physical activity and adoption of modern lifestyles, and diabetes. [24]

GDM showed an association with increasing age, high gravida, history of macrosomic baby, and family history

of diabetes and hypertension in various studies. [25,26,27] In our study, prevalence of GDM was found to be significantly associated with maternal age, gravida, maternal height, hypertension and family history of diabetes on bivariate analysis; but on multiple logistic regression analysis maternal age, hypertension were found as independent predictors of GDM. The age, results show a significant relation between diabetic mellitus and age were P-value=0.001and X2(8.860) increase in >35years answer YES were (71.4%) follow by NO were (44.2%), Gravida results show a significant relation between diabetic mellitus and Gravida were P-value=0.036 and X2 (10.255) increase in more than 4 answer YES were (57.1%) follow by NO were (38.5%),

The gravida/para/abortus (GPA) results show a significant relation between diabetic mellitus and GPA were P-value=0.026 and X2(11.008) increase in zero answer NO were (64.7%) follow by answer YES in zero and one were (28.6%) . (See Table 6)

History of BMI no significant negative of BMI and Gestational diabetes were P-value=0.609, and (Odd = 0.977, 95% CI = 0.893-1.068), while (B=-0.023, S.E.=0.046 and Wald=0.262). Pregnant women with obesity had increased risk of GDM than pregnant women with normal weight (95% CI=0.893, 1.068). Regarding GPA a significant Positive affect of GPA and Gestational diabetes were P-value=0.048, and (Odd = 1.586, 95%CI = 1.012-2.544). while (B=0.461, S.E.= 0.241 and Wald=3.654. (See Table 7) The finding was consistent with those of the previous meta-analysis conducted in sub-Saharan Africa [28].

A systematic review and meta-analysis by Nelson SM et al. which revealed [21] pre-pregnancy BMI was more strongly associated with the risk for GDM. The possible reason could be GDM due to the reduction of insulin sensitivity among obese pregnancies. In other words, obesity-related insulin resistance inflates the normal glucose levels [29] Swami et al., reported maternal age as important risk factor for GDM [30].

6. Conclusion

Prevalence of GDM is high among Saudi women. Older maternal age, higher BMI, higher blood pressure, a history of GDM in previous pregnancies, a his-tory of delivering malformed child, and a family history of diabetes were the main risk factors. Timely and effective treatment of gestational diabetes reduces perinatal morbidity and improves outcomes. In populations at high risk for GDM, as in Saudi Arabia, universal screening is recommended to reduce maternal and fetal morbidity and to allow for subsequent attempts to prevent or delay the onset of type 2 diabetes. Larger studies from different regions of Saudi Arabia are needed to confirm our results.

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