



Risk Factors for Developing Hypertensive Disorders in Diabetic Pregnancies – Experience from a Tertiary Care Hospital in Kerala

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Abstract

Objectives: Hypertensive Disorders of Pregnancy (HDP) are the leading cause of maternal and fetal mortality worldwide. Women with diabetes are at increased risk of HDP. Common risk factors like elevated BMI and advanced age have been noted. The main objective of the present study is to identify the risk factors for developing hypertension in diabetic pregnancies hence trying to improve pregnancy outcomes.

Materials & Methods: Pregnant patients diagnosed to have DM who received ANC from GMC KTM for a period of 6 months were included in the study. It was a prospective observational study comparing the study population with matched normoglycemic pregnant woman. Information was collected using a detailed proforma BP was taken using standard methods. For detecting diabetes IADPSG value of F 92mg/dl (>5.2 mmol/L) 1 hr 180mg/dl (>10.0 mmol/L) & 2 hr 153 mg/dl (\geq 8.5mmol/L) were taken.

Results: Majority of patients belonged to age group 21-30 years (83%). Diabetics are more prone to develop HDP compared to non diabetics (21.14% Vs 12.1%). There was increased incidence of HDP among primi (21%) compared to multi (12%); obese (83%) and over weight (30%) compared to patients with normal BMI (6%) 60% of diabetic patients, who developed HDP had poor glycemic control, which show that glycemic control has a strict relation with develop of HDP in patients with DM.

Conclusions: High BMI and poor glycemic control are significant contributors to the development patient of HDP in diabetic pregnancies.

Keywords: Risk factors, HDP: (Hypertensive Disorders in Pregnancy), Diabetes.

Introduction

Back ground

HDP is one of the leading cases of maternal & perinatal morbidity & mortality in developing countries.¹ Prevention of seizures, coagulopathy, stroke etc. could be accomplished by providing more intensive antenatal surveillance to woman who

are at high risk. HDP are responsible for 12-25% cases of maternal mortality during pregnancy & pureperium.¹ PE & E are leading threats to safe motherhood in developing countries where a woman is 7 times more likely to develop these conditions.² DM in pregnancy is common in South India (17.8%) DM.³ They are at increased risk of HDP (Gestational Hypertension & Preeclampsia) OR

1.5.⁴ There is no proteinuria in gestational hypertension which develop after 20 weeks where as preeclampsia is diagnosed in woman presenting with new onset hypertension and proteinuria during the second half of pregnancy. Chronic hypertension (3%), is defined as BP, 140/90 with onset prior to pregnancy or recognized by 20 weeks gestation. Woman with underlying chronic hypertension or pregestational diabetes are at increased risk for preeclampsia compared with normotensive and non diabetic woman, with rates of preeclampsia approximately 25% and 20% respectively.⁵ It is unclear whether these two conditions share a common pathophysiological pathway. Common pathophysiology like insulin resistance, chronic inflammation and endothelial dysfunction have been suggested. GDM and preeclampsia share many risk factors including advanced maternal age, nulliparity, obesity, poor glycemic control etc.^{5,6}

Objectives

1. The main objective of the present study is to identify the risk factors for developing hypertension in diabetic pregnancies there by trying to improve the pregnancy outcome.
2. To study the relation between hypertensive disorders of pregnancy and
 - a. Maternal age
 - b. Gravidity
 - c. Overt/gestational diabetes mellitus
 - d. Glycemic control
 - e. Treatment modality
 - f. Previous gestational hypertension

Materials & Methods

Study Design: Prospective Observational study

Study Period: 6 months from December 2016 to June 2017

Study Setting: Department of Obstetrics and Gynaecology, Government Medical College, Kottayam.

Study Population

- All antenatal women who were diagnosed to have diabetes mellitus (overt/GDM) and received antepartum and intrapartum care at

Government medical college, Kottayam during a period of 6 months from December 2016 to June 2017. Matched normoglycemic pregnant women were taken as controls.

Inclusion Criteria

- All antenatal women who were diagnosed to have diabetes mellitus (overt/GDM) who received ante partum and intrapartum care at Government Medical College, Kottayam during a period of 6 months from December 2016 to June 2017.
- Control Population: Matched normoglycemic pregnant women who received antepartum and intrapartum care at government Medical College, Kottayam during a period of 6 months from December 2016 to June 2017.

Exclusion Criteria

- a) Multiple pregnancy
- b) Chronic hypertension
- c) Renal disease
- d) Collagen vascular disease
- e) Hyperthyroidism
- f) Smoking

Sample Size

Comparison of proportions (independent proportions)

When the level of measurement is nominal/ordinal the researcher has to deal with proportions and the appropriate formula is

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \{P_1(1-P_1) + P_2(1-P_2)\}}{(P_1 - P_2)^2}$$

P_1 = Proportion with hypertension among AN mothers with no GDM (control)

P_2 = Proportion with hypertension among AN mothers with GDM (study group)

Based on a pilot study $P_1 = .12$ and $P_2 = .28$ and $n = 97$ per group.

Anticipating 10% dropout rate final sample size is 107 per group.

Study Tools: (given as Appendix)

1. Case Records
2. Clinical Examination
3. Laboratory Reports

Study Procedure

After getting Ethical committee clearance and consent from patients, and applying inclusion criteria and exclusion criteria antenatal women were taken up for the study. History was taken and clinical examination done and patients with diabetes were followed up during antenatal period for the development of hypertensive disorders.

Methods

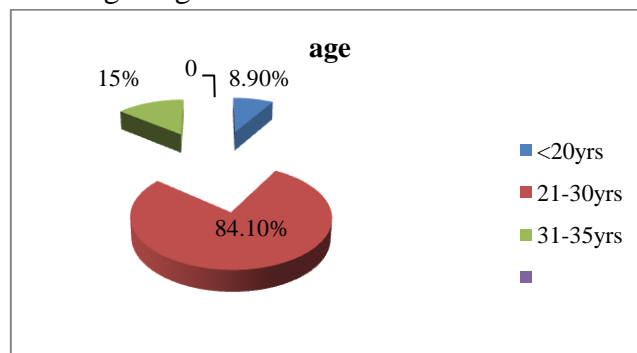
It is a prospective observational study conducted on antenatal women who are diagnosed to have diabetes mellitus (overt/GDM) and receive antepartum, intrpartum and postpartum care at GMC Kottayam for a period of six months. Matched normoglycemic patients are taken as controls. After getting ethical committee clearance and consent from patients, and applying inclusion criteria and exclusion criteria antenatal women are taken up for the study. History is taken and clinical examination done and patients with diabetes are followed up during antenatal period for the development of hypertensive disorders. Information was collected using questionnaires'. BP is taken using standard methods with Korotkoff 1 for systolic BP and Korotkoff 5 for diastolic BP. BP more than 140/90 on two occasions six hours apart is taken as hypertension. For detecting diabetes IADPSG values of fasting 92 mg/dl(>5.2 mmol /l), 1hr 150mg/dl (>10.0 mmol /l)and 2hr 153mg/dl(8.5mmol /l) are taken.Those having multiple pregnancy, chronic hypertension, renal disease, collagen vascular disease,hyperthyroidism are excluded from the study.

Data is entered in excel spread sheet and statistical analysis is with SPSS software. Qualitative variables were expressed in percentages, quantitative variables will be expressed in mean (SD).Association is found out using chi-square test and strength of association is assessed using odd's ratio

Results

Majority belonged to age group 21-30 yrs (84.1%)

Graph 1: Distribution of study population according to age



Primigravidas constituted 56.5

Table 1: Distribution of study population according to the past history

Past History	Number	Percentages
Nil	146	68.0%
GHTN	28	13.1%
GDM	27	12.6%
ODM	13	6.1%
GDM+GHTN	0	0.0%

13.1% gave a past history of gestational hypertension, 12.6% a h/o GDM and 6.1% overt DM. As expected there were a significantly higher proportion of hypertensive disorders of pregnancy in the diabetic group compared to those without diabetes. 38% of overt diabetes and 19% of gestational diabetes developed gestational hypertension. This is in accordance with this study of Tabias et al.⁷ who found a 26% increased risk of developing hypertension in those with a h/o GDM.

There was an increased proportion of hypertensive disorders among the older age groups. ($\chi^2 = 11.51, p = 0.003$.) There was no significant association between hypertensive disorders and parity in our study ($\chi^2 = 5.22, p = 0.356$). This is in accordance with studies by daSelva et al (OR 3.3, 95% CI:1.2; 8.7). It was more common in primigravidas. In a study by Aaabedha et al.⁸ there was no significant association between past h/o HDP and presence of HDP $\chi^2 = 1.13; p = 0.77$.

Coming to association between BMI and presence of HDP there was a significantly increased proportion of HDP in the obese and overweight patients.

Table 2: Association between BMI and presence of HDP

			BMI				Total
			18.5-23.5	23.6-25 kg/m ²	25.1-30kg/m ²	>30 kg/m ²	
HDP	No	Count	30	88	40	20	178
		%	93.8%	93.6%	70.2%	64.5%	83.2%
	Yes	Count	2	6	17	11	36
		%	6.3%	6.4%	29.8%	35.5%	16.8%
Total		Count	32	94	57	31	214
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Almost 34% of those with gestational diabetes and 60% with overt diabetes belongs to obese class I group. There was an increased proportion of hypertensive disorders among the obese and pre obese group in both diabetes and non diabetes groups which is in accordance with the study conducted by Nai et al.^{3,9} In a study in Tiajin, China woman with both pre pregnancy obesity and excess gestational weight gain had the highest (2.2 – 7.1 fold) risk of GDM and pregnancy induced hypertension compared with those with normal pre pregnancy BMI and adequate weight gain.¹⁰ A study of 2037 woman with GDM assessed the effects of pre pregnancy weight status, gestational weight gain and third trimester glycemic control by HbA1c on the risk of pregnancy induced HT the authors found that poor glycemic control (a OR: 2.5; 95% CI: 1.1-57) and pre pregnancy obesity (a OR: 8.9; 95% CI: 5.0-16.8) were associated with increased risk of pregnancy induced HT, but excessive gestational weight gain also increased risk (a OR: 1.9; 95% CI: 1.1-3.4). In our study high BMI was prevalent in both groups, but the mean BMI was higher in hypertensive woman. The study result is in agreement with Nucei et al.¹² who showed that over weight nutritional status was associated with an increased risk for preeclampsia.

In the present study about 60% who developed hypertensive disorders were those with poor glycemic control.

Table 3: Association between glycemic control and presence of HDP

			FBS			Total
			<92MG/DL	93-105	>105	
HDP	No	Count	60	13	11	84
		% within FBS	92.3%	65%	50%	78.5%
	Yes	Count	5	7	11	23
		% within FBS	7.7%	35%	50%	21.5%
Total		Count	65	20	22	107
		% within FBS	100.0%	100.0%	100.0%	100.0%

Moger et al.¹³ in his study, “The association between preeclampsia and the severity of gestational diabetes: the impact of glycemic control” did a comparison between patients with FPG < 105mg/dl and FPG > 105 mg/dl revealed that the rate of preeclampsia increased significantly 7.8% Vs 13.8% OR 1.81, 95% CI: 1.3 – 2.51. This is also in accordance with study by Berquel et al.¹¹

Table 4: Association between treatment modality and presence of HDP

			Treatment modality				Total
			MNT	OHA	MNT +INS ULIN	MNT+ OHA+INSULIN	
HDP	No	Count	41	13	25	5	84
		% within TRT	89.1%	92.8%	65.7%	55.5%	78.5%
	Yes	Count	5	1	13	4	23
		% within TRT	10.9%	7.2%	34.3%	44.5%	21.5%
Total		Count	46	14	38	9	107
		% within TRT	100.0%	100.0%	100.0%	100.0%	100.0%

Our study noticed an increased proportion of HDP among the patients taking insulin compared to those on MNT and OHA. ($\chi^2 = 43.42$, $p < 0.03$). This is probably reflecting the fact that patients taking insulin were having increased severity of diabetes compared to those on MNT and OHA.

Conclusion

It is evident from the present study that advanced age, high BMI and poor glycemic control are significant contributors to development of HDP in

diabetic pregnancy. Thus strict glycemic control plays a significant role in the prevention of hypertensive disorders. Excessive gestational weight gain, a modifiable risk factor may be prevented through focussed prepregnancy and antenatal surveillance.

Acknowledgement

We are extremely thankful to Prof. Dr.C.P.Vijayan, Prof & HOD. Department of Obstetrics and Gynecology for the valuable suggestions and guidance.

We also express our sincere thanks to all the patients who participated in our study.

Above all, we are grateful to Almighty God for his blessings that have led to the completion of this study.

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