**Title:** **Screening of Gestational Diabetes and Hypertension among Antenatal Women at Rural area of Western India**

**Abstract**

**Background:** Hypertension in pregnancy and gestational diabetes are among leading causes of maternal and perinatal mortality, especially in rural areas of developing countries with meager health facilities. With early diagnosis and treatment these can be decreased. The best solution for this is screening for same. Current study was planned with objectives of screening for gestational diabetes and hypertension among study population. **Methods:** A cross –sectional study was conducted at one of rural area of Gujarat province in India. Following random selection procedure, “Davas” village was selected. Throughout sampling procedure, multistage random sampling method was utilised. Total 346 antenatal women were screened.For screening of Gestational Diabetes, guidelines of American Diabetes Associationwere followed. **Results:** Majority of antenatal mothers 192(55.5%) belonged to 21-25 years age-group. 242 antenatal women were Multigravida, most deliveries were institutional (85.96%) among them. Of total 346, 17.6% were in prehypertensive stage. 1.2% and 0.2% had systolic blood pressure in stage I and II of hypertension respectively. 6(1.73%) had Random Blood Sugar levels >200 mg/dl. Present study found prevalence of systolic hypertension: 1.4%, Diastolic Hypertension: 0.9% and Gestational Diabetes: 1.73% among study population. **Conclusion:** Socioeconomically upper class, positive family history of hypertension and BMI ≥25 were found strong risk factors for occurrence of hypertension in pregnancy and gestational diabetes.

**Keywords: *Gestational diabetes, Hypertension, Screening***

**Introduction**

Maternal mortality and perinatal mortality are two very important reflections of developmental index of any country. Throughout globe, various nations have taken considerable painstaking efforts to reduce maternal and perinatal mortality to minimum possible levels for welfare of their citizens. Hypertension in pregnancy/Pre-eclampsia and gestational diabetes are among leading causes of maternal and perinatal mortality, especially in rural areas of developing countries with meager health facilities. Even the death audit for maternal or perinatal mortality is also not that much convincing in such situation. Due to same, the data showing prevalence of gestational diabetes or hypertension among antenatal mothers are also not very reliable for such area.

It is believed that 10-15% of maternal mortality in developing countries is due to Hypertensive Disorders of Pregnancy.1, 2 Various adverse effects of hypertension (HTN) in pregnancy includes preterm delivery, intrauterine growth retardation, reduced birth weight, still birth and perinatal mortality. 3, 4 Early detection and prompt care are required to prevent deleterious outcome of pregnancy with HTN. It makes ground that during the first prenatal visit a woman’s evaluation for level of risk for hypertension is recommended. In India, national health programme of Reproductive and Child Health has stipulation of routine screening of blood pressure of antenatal mothers at each visit and is to be supported by asking maternal history regarding alarming symptoms of HTN.

Gestational diabetes mellitus (GDM) is reciprocating its own kind of health hazards which ultimately jeopardize outcome of pregnancy. Prevalence of GDM in some ethnic groups ranges from 1 to 14% depending on different screening methods, diagnostic criteria and population screened. In some cases, GDM can negatively affect the pregnancy and result in adverse perinatal outcome like macrosomia, birth trauma, shoulder dystocia and higher rates of cesarean section. 5 In the Indian context, screening is essential in all pregnant women as Indian women have eleven-fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women. 6 However with early diagnosis and treatment these can be decreased. The best solution for this is screening for same. Most of the literature defines screening as the search for unrecognized disease or defect by means of rapidly applied tests, examinations or other procedures in apparently healthy individuals.

With this background in mind current study was planned with objectives of screening for gestational diabetes and hypertension among study population with intention of early diagnosis and initiation of early management: this way try to minimise complications and reduction of morbidity and mortality with reference to high-risk group.

**Methodology**

After obtaining permission from Institutional ethical committee, present study was conducted at one of rural area of Gujarat province in India. The study was conducted during March 2013 to June 2013. A cross –sectional study design was used to achieve study objectives. Throughout sampling procedure, multistage random sampling method was utilised. After preparing a list of districts of Gujarat state in their ascending order as per their population, Banaskantha district was randomly selected. Following random selection procedure, “Deesa” taluka and “Davas” village were selected at later stages.

The Primary Health Centre (PHC) of Davas was contacted. PHC – Primary Health centre is basic and primitive setting to provide health care facilities to rural population. PHC in Davas covers a total population of 39001 and 15 other villages around Davas, as per census 2011. Anganwadi centers are basic unit of Integrated Child Development Scheme run by Government of India and provide health care services to antenatal and postnatal women, adolescent girls and children less than 6 years of age. Among these health related services one main activity is regular antenatal check up at least once a month for all registered antenatal mothers of that particular area. Total 346 antenatal women were registered with all anganwadis covered by Davas PHC, all were interviewed and, after informed consent taken from each participant, they were included in study. So, study sample size was 346.

For screening of Gestational Diabetes, guidelines of American Diabetes Association 7 were followed which state that: A fasting plasma glucose level >126 mg/dl (7.0 mmol/l) or casual plasma glucose >200 mg/dl (11.1 mmol/l) meets threshold for diagnosis of diabetes, if conﬁrmed on a subsequent day, and precludes need for any glucose challenge. Following above mentioned guideline, casual (random) blood sugar levels (RBS) were measured using standard glucometer (Glucosign @ Accubiotech) with strips for measuring. Participants with RBS > 200 mg/day were re-screened on following day with Fasting Blood Sugar.

Blood Pressure(BP) was classified as per following criteria 8 : Normal, if within <120 SBP & < 80 DBP – Prehypertension, if within 120-139 SBP (Systolic BP) or 80-89 DBP (Diastolic BP), Stage I hypertension, if within 140-159 SBP or 90-99 DBP and stage II hypertension, if SBI ≥160 or DBP ≥ 100. Standard sphygmomanometer was used to measure the blood pressure. All BP measurements were taken in sitting position and on finding BP higher than normal the recording was repeated immediately and also day after that. Of all recording the lowest one was considered for data analysis. Data entry and data analysis were done with SPSS software. Risk factors for hypertension and diabetes were analysed by bi-variate analysis along with help of Odd’s ratio.

**Results:**

Table 1 shows the baseline Sociodemographic data of study participants. Majority of antenatal mothers 192(55.5%) belonged to 21-25 years age-group. It was noteworthy that 73(21.1%) pregnant women were less than or equal to 20 years of age while 10 participants were elderly pregnant, i.e., > 30 years aged. 61% expectant mothers were illiterate and only 0.9% had education at secondary school level while none of them were even completed the total years of schooling. Most of participant females were housewives (220, 63.6%) while 35% of mothers were indulged in strenuous labour activity. Some others occupation include Accredited Social Health Activist worker (1.2%) and Anganwadi workers (0.3%). Following modified Prasad classification for socioeconomic class, majority of women belonged to lower classes. 137(39.6%) were from class IV and 148(42.8%) belonged to socioeconomic class V. 25(7.2%) of antenatal women had BMI ≥ 25.

**Table 1: Baseline characteristics of study participants (n=346)**

|  |  |
| --- | --- |
| **Characteristics** | **No. of participants (%)** |
| **Age (yrs)** | |
| ≤ 20 | 73 (21.1) |
| 21 - 25 | 192 (55.5) |
| 26 - 30 | 71 (20.5) |
| 31 - 35 | 9 (2.6) |
| ≥ 36 | 1 (0.3) |
| **Education** | |
| Illiterate | 211 (61.0) |
| Primary | 132 (38.2) |
| Secondary and above | 3 (0.9) |
| **Occupation** | |
| Housewife | 220 (63.6) |
| Labourer | 121 (35.0) |
| Others | 5 (1.5) |
| **Socioeconomic Class** | |
| I | 3 (0.9) |
| II | 18 (5.2) |
| III | 40 (11.6) |
| IV | 137 (39.6) |
| V | 148 (42.8) |
| **BMI (Kg/M2)** | |
| <18.5 | 68 (19.7) |
| 18.5 – 25 | 253 (73.1) |
| ≥ 25 | 25 (7.2) |

Table 2 describes obstetric profiles of study participants. 242 (69.94%) antenatal women were Multigravida while 104(30.06%) were primigravida. In Multigravida participants, most deliveries were institutional (85.96%) while 11.57% had their deliveries conducted by Trained Birth Attendants.1.8% of deliveries were conducted by untrained attendants( includes relatives, neighbours and quacks), reflecting on scenario in rural areas of state. 14% of mothers had their last delivery without medical supervision. Majority of them had home delivery, however some of them delivered at their work place also – may be a farm or field of labour. Most participants underwent a full term normal delivery (58.21 %).

**Table 2: Obstetric profile of study Participants**

|  |  |
| --- | --- |
| **Characteristics** | **Number of participants (%)** |
| **Gravida** | |
| Primigravida | 104 (30.06) |
| Multigravida | 242 (69.94) |
| **Last Delivery conducted by (n=242)** | |
| Institutional Deliveries | 208 (85.96) |
| TBA | 28 (11.57) |
| Untrained | 6 ( 2.47) |
| **Mode of last Delivery(n=242)** | |
| Full Term Normal Delivery | 202(83.47) |
| Pre mature Delivery | 79(2.90) |
| Miscarriage | 2(0.83) |
| Abortion | 27(11.16) |
| Caesarian Section | 4(1.64) |

Figure 1 shows Distribution of Blood-pressure among antenatal women under study on screening. It suggests that 80.9% of study participants had their systolic blood pressure within range of normal while 17.6% were in prehypertensive stage. 1.2% and 0.2% had their systolic blood pressure in stage I and stage II of hypertension respectively. Diastolic blood pressure distribution was modest different. 90.8% had normal diastolic BP. 8.4% were in prehypertensive stage of Diastolic blood pressure while 0.6% and 0.3% had diastolic blood pressure in stage I and II of hypertension respectively.

**Figure 1: Distribution of Blood-pressure among antenatal women on screening**

Table 3 suggests role of various risk factors associated with hypertension, using odds ratio based on bi-variate analysis. The risk factors evaluated were age, BMI ≥ 25, lower socioeconomic class, occupation, education and family history positive for Hypertension. Socioeconomically upper class and positive family history of HTN were statistically significantly (P< 0.05) found to be associated with hypertension among study participants.

**Table 3: Odds ratio for risk factors found to be associated with Systolic Hypertension**

**(Bi-variate analysis)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RISK FACTORS** | **Odds ratio** | **95% Confidence Interval** | | **P value** |
| **Lower** | **Upper** |
| **Age >25 Years** | 0.81 | 0.08 | 7.37 | P>0.05 |
| **BMI ≥ 25** | 3.29 | 0.35 | 30.62 | P>0.05 |
| **SE Upper Class (I +II)** | 7.77 | 1.27 | 47.60 | **P<0.05** |
| **Housewife** | 0.14 | 0.01 | 1.26 | P>0.05 |
| **Education(Illiterate)** | 0.15 | 0.01 | 1.41 | P>0.05 |
| **Family History** | 71.78 | 7.62 | 675.69 | **P<0.05** |

The random blood sugar levels were checked for screening of GDM as per guidelines mentioned in methodology. The screening yields 6(1.73%) antenatal mothers had their RBS levels more than 200 mg/dl on two occasions: None of them were known case of diabetes while 340(98.27%) were had their RBS within normal range. (Figure 2)

**Figure 2: Prevalence of Gestational Diabetes among antenatal women on screening**

Role of various risk factors associated with Gestational Diabetes, using odds ratio based on bi-variate analysis is suggested by Table 4. It shows that, upon analyzing various risk factors like: age, BMI ≥ 25, upper socioeconomic class, occupation, education and family history positive for Hypertension, only BMI ≥25 was statistically significantly (P< 0.05) found to be associated with GDM among study participants.

**Table 4: Odds ratio for risk factors found to be associated with Gestational Diabetes**

**(Bi-variate analysis)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RISK FACTORS** | **Odds ratio** | **95% Confidence Interval** | | **P value** |
| **Lower** | **Upper** |
| **Age >25 Years** | 1.66 | 0.3 | 9.26 | P>0.05 |
| **BMI ≥25** | 75.95 | 8.48 | 680.0 | **P<0.05** |
| **SE Upper Class (I +II)** | 1.53 | 0.73 | 3.21 | P>0.05 |
| **Housewife** | 1.14 | 0.20 | 6.35 | P>0.05 |
| **Education(Illiterate)** | 1.29 | 0.23 | 7.14 | P>0.05 |
| **Family History** | 1.78 | 0.27 | 8.13 | P>0.05 |

**Discussion:**

In present study, most of participants (55.5%) were among 21-25 years age group and 61% were illiterate. In similar study done by Rajput et al 9 58.2% were in 21-25 years age-group while only 4.9% were Illiterate. Literacy rate in present study was quiet poor as compared to national average for females (65.46%) 10  and Gujarat state (70.73%) 10 for females. The reason may be due to selected district was one of remote area with tribal vicinity. In same study, Rajput et al 9 found 8.2% participants had BMI≥25 while in current study it was almost same: i.e., 7.2%.

The study 11 conducted in Punjab region of India showed prevalence of systolic hypertension was 4.45 % and of diastolic hypertension 4.2% in all studied pregnant females while present study found prevalence of systolic HTN was only 1.4% and Diastolic HTN was 0.9%. Sayeed et al. 12 in their study at Bangladesh found crude prevalence of systolic and diastolic hypertension was 6.8 and 5.4%, respectively. Bener and Saleh 13 in their study at Qatar found maternal age > 30, increased BMI, previous abortion, lack of antenatal care, and physical activity were found to be significantly associated with increased risk of PIH. In current study socioeconomically upper class and positive family history of HTN were statistically significantly found to be associated with hypertension among study participants.

In present study, prevalence of GDM was found 1.73%. Kalra et al 14 found prevalence of GDM among study population was 6.6% while Gupta etal 15 at Jammu region of India found same 3.05%. Data reveals wide variation in prevalence of gestational diabetes in Indian context. Study 9 conducted in Haryana, North India, showed 7.1% prevalence while a study 16 conducted in South India revealed prevalence of 17.8% women in urban, 13.8% in semi urban and 9.9% in rural population. Sayeed et al 12 in Bangladesh found prevalence of diabetes was 6.8% according to FBG. In present study, it was found that upon analyzing various risk factors, only BMI ≥25 was significantly found to be associated with GDM while Sheshiahet al 16 found that age ≥25 years, BMI ≥25 kg/m2 and positive family history of diabetes were significantly associated with GDM. Rajput et al 9  found socioeconomic status > upper middle class, Kalra et al 14 found that Family history of diabetes mellitus, age ≥25 years, past history of GDM, and BMI ≥25 kg/m were significantly associated with GDM group

**Conclusion & Recommendations:**

Present study found prevalence of systolic HTN: 1.4%, Diastolic HTN: 0.9%, GDM: 1.73%. Socioeconomically upper class and positive family history of HTN were statistically significantly found to be associated with hypertension while on analyzing various risk factors; only BMI ≥25 was statistically significantly found to be associated with GDM among study participants. Government is expending millions of money as well mammoth manpower to decrease maternal and perinatal mortality, still there are so many who skip the early diagnosis, especially at remote rural and tribal areas.

It is recommended that what was found suggests tip of the iceberg. Overall situation of Gestational diabetes and hypertension in Gujarat state should be evaluated with multicentric study, which can be helpful to sensitise the health providers, i.e., physicians at grass root level as well as the bureaucrats – the policy makers at administrative level with actual prevalence of same. Health education should be imposed to antenatal mothers by paramedical workers regarding alarming symptoms of HTN and DM for early self identification. Adopting healthy life style is the key to long, disease or disability free life. Tracking of Hypertension and or diabetes should be done among families with strong positive family history of same diseases.

**Conflict of Interest: None**

**Limitation of Study:** Though most of the research nowadays recommends Oral Glucose Tolerance Test (OGTT) as a method of choice for screening of Diabetes, same was not possible in this study. Though pregnant women found at risk were counseled to go to higher set up for further evaluation and management.

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