



Appraisalment of Preponderance and Risk Factors of Gestational Hypertension in a Tertiary Care Hospital

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Abstract

Gestational hypertension and preeclampsia are hypertensive disorders during pregnancy (HDP). Gestational hypertension is a condition of onset of hypertension without proteinuria after 20 weeks of gestation whereas preeclampsia is refers to the onset of hypertension and proteinuria after 20 weeks of gestation. The aim of prospective observational study is to appraise the preponderance and risk factors of gestational hypertension in a tertiary care referral hospital. The study was carried out at the in-patient and out -patient setting of a private tertiary level hospital at the Malabar region of Kerala. The study was carried out for a period of 12 months. Based on inclusion criteria a total of 150 eligible consenting antenatal mothers were enrolled and participated in the study. All the study subjects were screened for GHTN, 35 subjects were categorized into GHTN group and 115 to non GHTN group. The prevalence of GHTN is about 23%. A number of risk factors for GHTN were identified, including age > 35 yrs. overweight, history of hypertension as well as family history of hypertension and diabetes. The prevalence of preterm birth, IUGR, NICU admission was significantly higher in women in GHTN than those with non GHTN. The percentage of cesarean delivery is higher in GHTN women than that of non GHTN women and the percentage of low birth weight of infants is higher in GHTN patients when compared to non GHTN patients. Nifedipine is commonly used in the management of GHTN. The possible risk factors confirmed in the study may be useful for the development of early diagnosis and appropriate treatment of GHTN.

Keywords: Gestational Hypertension; Preeclampsia; Hypertensive Disorders during Pregnancy (HDP)

Introduction

Gestational hypertension and preeclampsia are hypertensive disorders during pregnancy (HDP). Gestational hypertension is a condition of onset of hypertension without proteinuria after 20 weeks of gestation whereas preeclampsia is refers to the onset of hypertension and proteinuria after 20 weeks of gestation. Gestational hypertension occurs in approximately 6% of pregnancies and evolves into preeclampsia in 10% to 20% of cases [1-5]. HDP are group of medical complications in pregnancy and it is a major cause of maternal and neonatal mortality and morbidity.

Gestational hypertension is a condition in which systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg in a previously normotensive pregnant woman that is ≥ 20 weeks of gestation and has no proteinuria or new signs of end-organ dys-

function. The blood pressure readings should be documented on at least two occasions at least four hours apart. It is considered severe when sustained elevations in systolic blood pressure ≥ 160 mmHg and/or diastolic blood pressure ≥ 110 mmHg are present for at least four hours. Gestational hypertension is a temporary diagnosis for hypertensive pregnant women who do not meet criteria for preeclampsia or chronic hypertension (hypertension first detected before the 20th week of pregnancy).

Preeclampsia is diagnosed as hypertension with significant proteinuria, specifically gestational hypertension with new onset proteinuria, or chronic (preexisting) hypertension with new or worsening proteinuria. When preeclampsia develops in women with chronic (preexisting) hypertension, the classification of disease is chronic (preexisting) hypertension plus superimposed preeclamp-

sia. Edema is not considered as specific diagnostic criterion for pre-eclampsia. Pregnant women with hypertension with other adverse conditions but no proteinuria should have further evaluation for preeclampsia.

Assessing the epidemiology of pre-eclampsia is difficult due to lack of conformity of the definitions. The incidence of pre-eclampsia for developing countries was estimated to be 3.4%. The incidence of pre-eclampsia was estimated to be 2.8% from the Norwegian Birth Registry for the period 1967-1998. The South East Thames Study estimated that pre-eclampsia incidence to be 0.4% for the period 1997-1998 [6]. The 0.4% incidence rate estimate from the South East Thames Study was used as the estimate of pre-eclampsia incidence for all WHO. A sub-regions Incidence for eclampsia from the systematic review was 2.3% of pre-eclampsia cases for developing regions and 0.8% of pre-eclampsia cases for developed regions.

HELLP syndrome i.e. hemolysis, elevated liver enzymes and low platelet count is form of severe preeclampsia with high rates of neonatal and maternal morbidity. It occurs in 5 to 10% of patients with hypertension in pregnancy. HELLP syndrome was defined by the presence of all of the three following criteria: hemolysis (characteristic peripheral blood smear), serum lactate dehydrogenase ≥ 600 U/l, total serum bilirubin ≥ 1.2 mg/ml, elevated liver enzymes (serum aspartate aminotransferase ≥ 70 U/l) and low platelet count ($< 100,000/\mu\text{l}$). Partial HELLP syndrome (PHS) is defined, by the presence of one or two features of HELLP syndrome but not the complete syndrome [7-13].

Methodology

A prospective observational study was conducted among antenatal mothers with the aim to appraise the preponderance and risk factors of Gestational hypertension in a tertiary care referral hospital. The prospective observational study was carried out for a period of 12 months. The population of the study was all antenatal mothers who satisfy the inclusion criteria consulting at the Obstructors and Gynecology department of Kims- Alshifa hospital during the baseline data collection period. Patient excluded pregnant women with gestational age of less than 20 weeks and pregnant women with history of hypertension. Based on inclusion criteria a total of 150 eligible consenting antenatal mothers were enrolled and participated in the study. All the study subjects were screened for GHTN, 35 subjects were categorized into GHTN group and 115 to non GHTN group. Kuppusswamy's socioeconomic status

is an important tool in hospital and community based research in India. It was proposed in 1976. This scale takes account of education, occupation and income of the family to classify study groups in to high, middle, and low socioeconomic status. Revised scale in 2012 to define socioeconomic status has obtained by revision of family income per month (in Rs). In this study Kuppusswamy's socioeconomic status scale modified for 2012 was used.

The first phase includes the identification and documentation of risk factors, complications and to study the current treatment practice followed The second phase includes creating awareness among patient about risk factors, complications and to educate them for the effective management of the disease by providing patient counseling with the help of a patient information leaflet.

All the antenatal mothers consulting at the Obstructors and Gynecology department during the study period were enrolled in the study based on inclusion criteria after obtaining the informed consent for the participation in the study. All the relevant information regarding the study was collected from the study subjects with the help of a specially design data collection form and questionnaire. Before data collection all subjects were informed that the study is to explore their personal background and their medical details and the treatment patterns. Confidentiality was addressed. Data were collected anonymously.

Patient education is a key component for the effective self-management of the gestational hypertension. Each and every participant was counseled about the management of the disease, risk and complication, therapeutic lifestyle changes including dietary modifications and exercise. Patients were encouraged to adhere to healthy lifestyle habits and medications to prevent from future risk of hypertension.

Data on prevalence of risk factors and complications were collected from all the study subjects. The following definitions were used:

- **Body Mass Index (BMI):** Weight in kilograms divided by the square meter of the height.
- **Family history of GHTN:** Self-reported or collected from the case record or from the physician.
- **Past history of GHTN:** Being self-reported or collected from case record or physician.
- **Past history of GDM:** Being self-reported or collected from case record or physician.
- **NICU Admission:** Self-reported, collected from case record.

All the statistically analysis was carried out using statistical package for social sciences (SPSS) software version 20.0 for WINDOWS. The collected data from 150 subjects were analyzed by statistical treatment using appropriate statistical tools. The following statistical methods were used in the investigation; Descriptive Statistics: For continuous variables mean, standard deviation, minimum and maximum were calculated for summarizing the raw data. For categorical variables frequency and percentages were calculated. In the case of discrete data, median and quartile deviations were calculated for condensing the raw data. Chi square test: Chi square test was used for finding significant difference/association between categorical dependent variables with respect to various groups. Paired t test: was used for comparing two groups with respect to each parameter. P value: p value less than 0.05 is considered to be statistically significant.

Results

Age wise distribution among GHTN and non GHTN subjects

Compared to non GHTN subjects, most of the GHTN patients were in the age group between 20 - 25 years with the mean age of 27.94 ± 6.49, p value < 0.05 and it was found to be statistically significant.

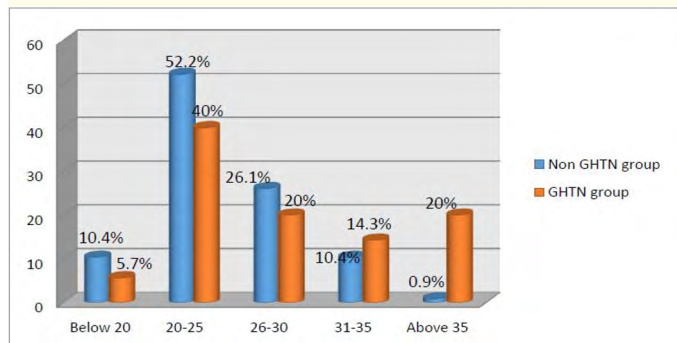


Figure 1

Region wise distribution among GHTN and non GHTN group

Among GHTN group, 25 (71.4%) patients were found to be residing at rural area and 10 (28.6%) patients residing at urban area. Where as in non GHTN group 77 (67%) study subjects were from rural areas and 38 (33%) patients were residing at urban area.

Prevalence of risk factors associated with GHTN

In analysis of risk factor associated with GHTN, family history of HTN and past history of GHTN were more prevalent in GHTN

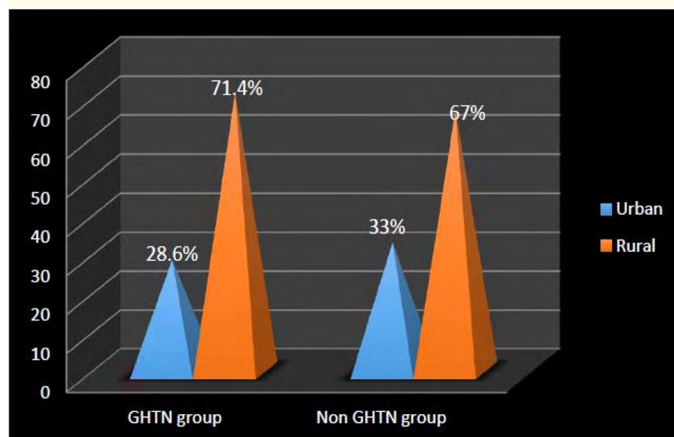


Figure 2

group than non GHTN group. Among GHTN group, the percentage with family history of hypertension was 51.4% which was higher than the 7% non GHTN group. Chi-square test showed that there was a statistical significant difference (p value < 0.05) between the risk factor of family history of hypertension among GHTN and non GHTN women. Similarly the percentage of GHTN with family history of GHTN (51.4%) was higher than non GHTN women (7.0%). A significant statistical difference (p value < 0.05) was observed between the family history of GHTN among GHTN and non GHTN group. Similar result were obtained in women with past history of DM (40.0%) and it was also statistically significant (p value < 0.05). The percentage of women with age > 35 years was higher in GHTN group (22.9%) than non GHTN group (0) and percentage of BMI > 26 kg/m² were also higher in GHTN group (74.3%). This difference showed a highly significant result (p value < 0.05). No significant difference was found for other risk factor like history of multiple gestations among GHTN and non GHTN group.

Rick factors	GHTN group (%) (n = 35)	Non GHTN group (%) (n = 115)	Chi square	p value
Age > 35 years	8 (22.9)	0	27.767	0.0001
BMI >26 kg/m ²	26 (74.3)	44 (38.3)	13.992	0.0001
Family history of HTN	17 (48.6)	15 (13.0)	20.182	0.0001
Family history of GHTN	18 (51.4)	8 (7.0)	37.037	0.0001
Past history of DM	14 (40.0)	11 (9.6)	17.896	0.0001
Past multiple gestation	2 (5.7)	2 (1.7)	1.634	0.201

Prevalence of complications among GHTN group

The prevalence of complications associated with GHTN was assessed and compared statistically using chi square test. Among two groups the most prevailing complications associated with GHTN were found to be IUGR (14.3%), it is higher in GHTN group than with non GHTN group (0.9%) and it is statistically significant (p value < 0.05). Similarly the percentage of pregnant women with Eclampsia is also higher in GHTN group (5.7%) and it is statistically significant (p value < 0.05). The percentage of other complication such as cerebrovascular accident in women is higher in GHTN group (2.9%) and it is not statistically significant.

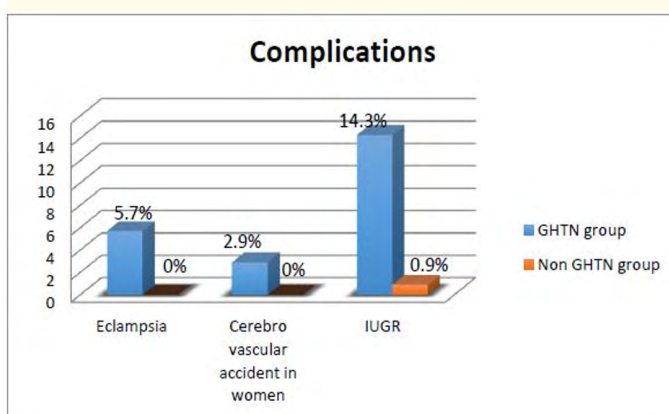


Figure 3

Delivery outcomes among GHTN and non GHTN subjects

In GHTN group, the percentage of women who have undergone caesarean section (82.9%) was higher than women who have undergone assisted vaginal delivery (2.9%) and spontaneous vaginal delivery (14.3%). While the percentage of caesarean delivery in non GHTN group was found to be 32.2% and spontaneous vaginal delivery was 60.0% and assisted vaginal delivery was found to be 8.7%. The prevalence of caesarean delivery was statistically higher in GHTN group than in non GHTN group whereas spontaneous vaginal delivery was higher (60%) in non GHTN group. The observation was statistically significant with p value < 0.05 .

Fetal outcomes in GHTN and non GHTN groups

The percentage of infants with low birth weight was found to be 28.6% and NICU Admission. 11.4% were higher in GHTN group than with non GHTN group. These values are statistically significant p value < 0.05 . The percentage of still born and post-natal

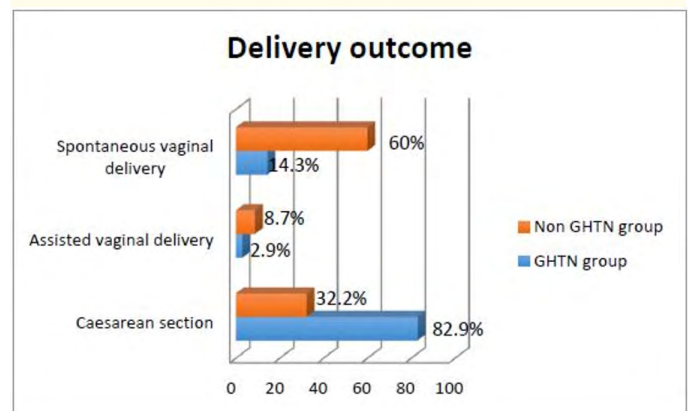


Figure 4

death are 2.9% each which was higher in GHTN group and no significant correlation was observed between these fetal outcomes. The percentage of multi gravida pregnancy (77%) was higher in GHTN patients than with prime gravida pregnancy (23%) group. These are statistically significant with p value < 0.05 .

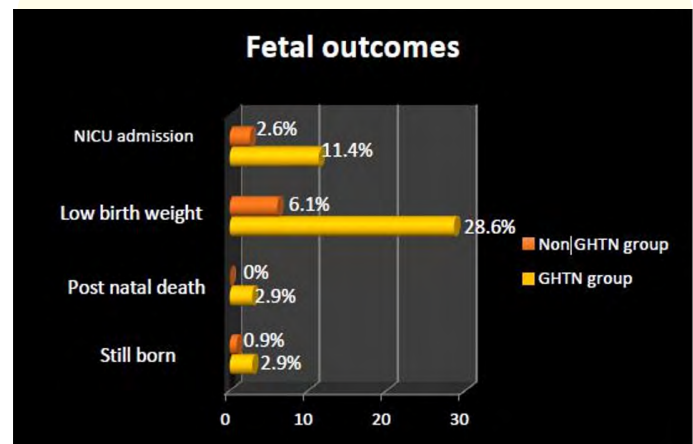


Figure 5

Treatment pattern in GHTN group

In the present study, out of 150 patients 35 were diagnosed as GHTN and they were managed with nifedipine, methyl dopa, and labetalol. Nifedipine was used at a dose of about 10 mg whereas methyl dopa and labetalol in 250 mg and 100 mg respectively. Out of 35 subjects 20 (57.14%) were managed with nifedipine, 10 (28.5%) subjects were managed with labetalol and 5 (14.3%) subjects were managed with methyl dopa.

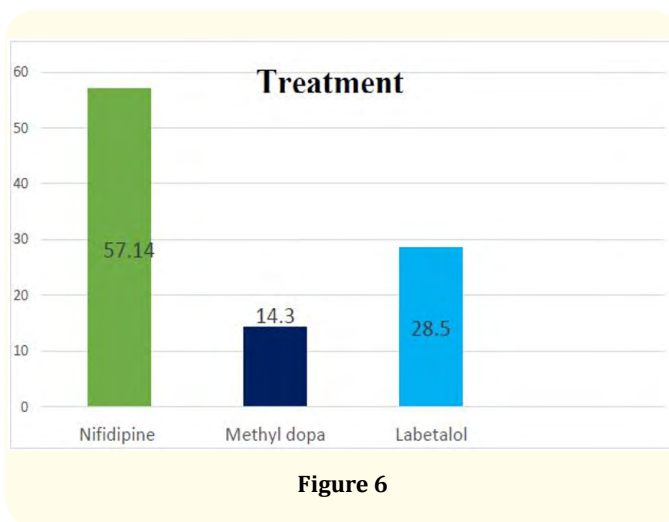


Figure 6

Discussion

Pregnancy Induced Hypertension is a syndrome of hypertension with or without proteinuria and edema, with the clinical manifestation usually occurring late in pregnancy and regressing after delivery of the concepts. PIH is a known cause of premature delivery, Intra uterine growth retardation, placental abruption and fetal death, as well as maternal mortality and morbidity. The prevalence of hypertensive disorder of pregnancy is 8 - 10% of all pregnancies in the population worldwide. HDP related complications are still threatening maternal and fetal life and health. The prognosis of HDP is associated with the severity of disease process. In general, the more severe the disease, the poorer will be the prognosis. Despite a massive research effort, there was also lack of efficient therapeutic methods in clinic at present. For the unpredictable characteristic and potential poor prognosis, symptomatic treatment to relieve clinical symptoms and timely termination of pregnancy were the main treatment measures, which can effectively increase curative rate and decrease complication rate and mortality. The present study was conducted with the aim to appraise the preponderance, risk factors, complications, and the management of Gestational hypertension in a tertiary care referral hospital at Perinthalmanna, Malappuram, Kerala. In this prospective observational study, as per the demographics collected, out of 150 subjects, 35 (23%) were diagnosed as GHTN and thus the prevalence of GHTN was found to be 23%, which was quite high compared to the study of Manjusha., *et al.* [14] in Pune, they observed a prevalence of 7 - 8%. Muhammed Obaid Ur Rehman., *et al.* performed a similar study in Karachi and found a prevalence rate of 37% [15-21]. Zenebe W., *et al.* [22] in Jimma found a prevalence rate of

8.5%. Franklin David Kilembe in Malawi found a prevalence rate of 52.1%. Swati Singh., *et al.* [20] in Nigeria found a prevalence rate of 17%. GHTN showed an association with increasing age, BMI, family history of hypertension and past history of hypertension in various studies. In the present study the prevalence of GHTN was found to be associated with increasing age, lower education level, socio economic status, BMI, family history of HTN and past history of GHTN. The study estimates that most of the GHTN were in the age group between 20 - 25 years compared with non GHTN group, with the mean age of 27.94 ± 6.49 , p value < 0.05 and it was found to be statistically significant. Similar study in china showed age $> 35 - 39$ years are 1.8 times higher risk than 20 - 24 years women and 2.4 times higher in those aged 40 years and older. A significant association was found between prevalence of GHTN and increasing BMI of participants. In Chun Ye., *et al.* [2] studies showed that there is a close relationship between HDP and the pre-pregnancy BMI. They suggest that each increase of 5 - 7 kg/m^2 in BMI doubles the risk of developing preeclampsia. Obesity is associated with insulin resistance, dyslipidaemia, chronic inflammation and oxidative stress, all of which have been demonstrated in women presenting with PIH. As a result of the strong relationship observed, the association between increasing changes in BMI and risk of PIH may support that obesity mediated inflammatory changes may play a role in the pathogenesis of PIH. WKBA Owiredu., *et al.* [6] also found that obesity as a risk factor for developing GHTN.

In our study showed that women with a low level of education are more likely to develop GHTN than those who have received a higher level of education. Chun Ye., *et al.* in china had found similar result between the education level of the pregnant women and gestational hypertension. WKBA Owiredu., *et al.* showed that educational status in GHTN women was not associated with PIH. Pratima V., *et al.* [15] studies showed that they could not found any association between educational status of pregnant women with causation of hypertension during pregnancy. The results from the study state that the educational qualification was not statistically significant. It was found that the prevalence of GHTN was more in rural than urban women. Compared to non GHTN group it was found to be an increasing prevalence of GHTN in participants who are residing at rural areas. There was no statistically significant association with gestational hypertension seen with socio economic status of the patients. J Prakash., *et al.* [4] conducted similar study in India and they found that the prevalence of gestational hypertension are more in low socio-economic status. While the preva-

lence of hypertension disorders of pregnancy in studies conducted outside India were different may due to some genetic and environmental factors like climate, altitude, socio economic conditions etc. In our study the prevalence of GHTN patients are higher in Upper and Upper middle class compared to non GHTN group. This association could be related to multiple factors such as maternal age, higher pre-pregnancy weight and BMI, life style in women of higher socio economic status [23,24].

Family history of hypertension has been reported to be associated with higher chances of developing GHTN. In this study significantly high percent of women with GHTN had a positive family history of hypertension (48.6%), Family history of GHTN (51.4%) and past history of DM (40%) compared to non GHTN group. The result was statistically significant with p value < 0.05. Chun Ye., *et al.* also found similar result with high percent of GHTN women with family history of hypertension, family history of GHTN, past history of DM, age > 35 years and obesity. WKBA Owiredu., *et al.* in Ghana and Caroline A., *et al.* in Brazil also found the similar results. Other studies showed that past multiple gestation was also a risk factors for developing GHTN. In the study results the past multiple gestation with GHTN was not statistically significant (p value > 0.05). Chun ye., *et al.* in china conducted a study and found out that there was a significant association between GHTN and age > 35 years, twin pregnancy, over weight and obesity, primi para, history of hypertension as well as family history of hypertension and diabetes. The study showed that the most common complications seen in GHTN mothers were IUGR (14.3%) followed by Eclampsia (5.7%) and Cerebro vascular accident in women (2.9%). The findings are statistically significant. On evaluation of delivery outcomes of GHTN and non GHTN women it had been observed a higher rate of cesarean delivery (82.9%) among GHTN group. In non GHTN women the most prevalent outcomes was spontaneous vaginal delivery (60%). The observation was statistically significant with p value < 0.05. This results correlates with the observation of Solange Regina., *et al* [25]. Infants who were admitted in the NICU was 11.4% in GHTN group where as in non GHTN were 2.6%. Percentage infants of low birth weight were higher in GHTN (28.6%) than non GHTN group (6.1%) and still born were 2.9%. By statistical correlation it was found that the prevalence of NICU admission, low birth weight was higher in GHTN than in non GHTN group with statistical significance, p value < 0.05. The prevalence of still born was not statistically significant (p value > 0.05). This study correlates with the observation of Solange Regina., *et al.* Another study by J Prakash., *et al.* found that fetal and neonatal

outcome of gestational hypertension increased prevalence of IUGR, prematurity and perinatal mortality. Preterm delivery in 28.8%, still births in 4.8% and overall perinatal mortality of 14.8% were reported in an Indian study.

Among 150 patients, 35 were diagnosed as GHTN patients and they were managed with Nifedipine, Methyl dopa and Labetalol. Nifedipine used for the management of GHTN patients was Nicardia R 10 mg BD, Methyl dopa were 250 mg OD and Labetalol were 100 mg OD. Out of 35 GHTN patients 20 (57.14%) patients were managed with Nifedipine, 5 (14.3%) patients with Methyl dopa and 10 (28.5%) patients with Labetalol. The drugs included in the other classes, for the treatment of hypertension is not used for the management of GHTN because it produce teratogenic effect and produce adverse effect to mother. Nifedipine was most commonly prescribed antihypertensive drugs in 57.14% of GHTN patients. Similarly in a study by Manjusha., *et al.* Methyl dopa was most commonly prescribed antihypertensive drugs in 17% of patients. The studies from Ray JG., *et al.* showed that Nifedipine (47.7%) was prescribed more frequently than Methyl dopa (27.7%). This shows that utilization pattern differs from hospitals, prescribers and among countries also.

Primipara and multi paras should be monitored carefully for hypertension. Health care providers should counsel women at risk on prevention measures such as nutrition, weight and stress management, and early and continual monitoring of gestational hypertension throughout the pregnancy. Community education efforts for women for childbearing age are also needed to reinforce the importance of healthy diets, regular physical activity, and maintaining a healthy weight before and during pregnancy. The knowledge of important risk factors in our population could be useful to help clinician to detect pregnant women who will develop pre-eclampsia. Prevention of hypertensive diseases in pregnancy would mean a huge step forward in prenatal care and assuming that effective prenatal is available, it may have greater potential in the treatment of these diseases.

The study was conducted in only one setting and the sample size was very low. Therefore the results may not be extrapolated to populations. The study period was too short to identify more significant results in all outcomes. Patients were partially cooperating with the study because of their anxiety therefore it affects the significance of the result. The study explored a large number of factors, but because of the small sample size and too short duration of

the study the effects of pharmacist's intervention on some of the factors cannot be detected.

Conclusion

Gestational hypertension is one of the serious complications in pregnancy which leads to adverse effects to both mother and fetus in her womb. Almost 20% of maternal death in India occurred due to hypertensive disorder of pregnancy. In 2013, the Maternal Mortality Rate (MMR) of India was 178 per one lakh live births. The situation was worst in Assam and Uttar Pradesh. According to the survey of Annual Survey Bulletin In August 2011, the MMR of Faizabad division was 451 per lakh which was highest in the country, while Kerala has the lowest MMR of 81 per lakh. The national is to achieve the MMR of 109 per lakh by 2015. There are many causes for increasing the MMR and hypertensive disorders play a role for that. The prevalence of HDP was 8 - 10% of all pregnancies in the population worldwide. The prevalence of Gestational hypertension may vary from region, race, climate, socioeconomic status, family history, personal history and their life style changes. The prevalence of Gestational hypertension in the study was 23%. This could be due to life style pattern of patients, obesity and family history of hypertension and past history of hypertension. The prevalence of risk factors was higher in the study. Complications of GHTN include IUGR, Eclampsia and fetal complications like preterm delivery, low birth weight, still born. The alarmingly high rate of these risk factors remains a cause of concern and a challenge that needs to be tackled to prevent any adverse effects of the disease in mothers and their children. The exact etiology and pathophysiology of pregnancy induced hypertension is unknown. For the unpredictable characteristic and potential poor prognosis, symptomatic treatment to relieve clinical symptoms and timely termination of pregnancy were the main treatment measures, which can effectively increase curative rate and decrease complication rate and mortality. Obesity and age > 35 years are risk factors for developing gestational hypertension. Age > 35 years have 1.8 times more risk than patients who have an age group of 20 - 25 years and 2.4 times more risk in patients having age > 40 years. The result obtained from the study reveals the importance of proper screening, diagnosis and management of GHTN in pregnant women by the clinicians to prevent the future burden of pre-eclampsia and hypertension. Strictly controlling of blood pressure definitely gives good outcomes of gestational hypertension pregnancy. It should be given equal importance to primigravida and multigravida women for the screening of gestational hypertension. There is a risk factor

for children for developing hypertension from a gestational hypertensive mother. Hence future risk for obesity and hypertension to offspring of gestational hypertension mother should be monitored. Prevention of hypertensive diseases in pregnancy would mean a huge step forward in prenatal care and, assuming that effective prenatal is available, it may have greater potential in the treatment of these diseases. Increased awareness of the magnitude and timing of risk of hypertension after gestational hypertension among patients and clinicians could provide an opportunity to test and use dietary, life style and pharmacological interventions that might prevent or delay the onset of hypertension in affected women. A major part of GHTN management involves educating the patient about diet, exercise, rest, need of regular checkups, blood pressure monitoring and medication adherence. Pharmacists can optimize overall care of a gestational hypertensive patient by educating, monitoring, and intervening or assisting the patient in the management of gestational hypertension. There is a need for pharmacist intervention in the prevention and management of GHTN and provide guidance to the patients of GHTN regarding diet plan and exercise to prevent it.

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