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Incidence of pregnancy-induced hypertension in block Hazratbal of district Srinagar, Jammu and Kashmir: a prospective longitudinal study

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ABSTRACT

Background: The term pregnancy induced hypertension (PIH) suggests a disorder of blood pressure that arises because of the pregnancy. PIH is defined as new onset hypertension with or without significant proteinuria emerging after 20 weeks of gestation, during labour, or in first 48 hours post-partum. It is classified as gestational hypertension (without proteinuria), preeclampsia (with proteinuria), and eclampsia (associated with convulsions). Incidence of PIH varies from country to country and has been reported to occur as low as 0.51% to as high as 38.4%. The objectives of the study were to estimate the incidence of PIH in block Hazratbal, Srinagar and to see the extent of progression of gestational hypertension into preeclampsia and eclampsia.

Methods: A community based longitudinal study was conducted in block Hazratbal (district Srinagar) for a period of 18 months. All the pregnant females attending the antenatal clinic at the sub-centers and PHCs were included in the study and assessed for eligibility (less than 20 weeks and normotensive), till the desired number of 385 eligible pregnant females was reached. The pregnant women enrolled in the study were examined again around 30 weeks, 37 weeks and once in postnatal period.

Results: The incidence of PIH was 20%. Majority of them (14.5%) had Gestational Hypertension and about one-fourth (5.5%) progressed to pre-eclampsia, while no one developed eclampsia.

Conclusions: PIH is common among Kashmiri females, 20 out of 100 pregnant females develop PIH. PIH is a major cause of perinatal mortality, preterm delivery, IUGR, and maternal morbidity and mortality.

Keywords: PIH, Incidence, Hazratbal, Srinagar

INTRODUCTION

Pregnancy is a normal physiological state which a woman experiences at some point of her life. During pregnancy a woman may develop complications which pose a risk to both maternal and fetal health. United Nations estimates of maternal mortality showed that number of maternal

deaths globally in year 2000 was 529,000, 99% of which were in developing countries and almost equally divided between Africa (251,000) and Asia (253,000), with India contributing 136,000 maternal deaths. A comprehensive analysis of the burden of obstetric morbidity and mortality would need to address both direct and indirect causes of maternal deaths and disabilities. Among these

complications, hypertension during pregnancy contributes significantly (12%) to the maternal mortality. The association of hypertension with proteinuria during pregnancy markedly increases the risk of perinatal mortality and morbidity. 3

National high blood pressure education program working group (NHBPEP) and the American college of obstetricians and gynacologists (ACOG), have defined hypertension in pregnancy as

- Systolic blood pressure of 140 mmhg or higher and/or.
- Diastolic blood pressure of 90 mmhg or higher.

Hypertensive disorders during pregnancy have been classified clinically by the International Society for the Study of Hypertension in Pregnancy (ISSHP) into four well-defined groups:

- 1. Gestational hypertension,
- 2. Preeclampsia, eclampsia,
- 3. Chronic hypertension,
- 4. Preeclampsia superimposed on chronic hypertension.

Gestational hypertension

New onset hypertension developing after 20 weeks of gestation, during labour, or in first 48 hours post-partum, without significant proteinuria, in a previously normotensive, normo-proteinuric women, and the blood pressure resolves within 3 months postpartum.

Preeclampsia

Gestational hypertension associated with proteinuria ≥300 mg/ 24 hours urine collection, or 1+ by qualitative urine examination, after 20 weeks of gestation.

Eclampsia

Convulsions occurring in a patient with preeclampsia, which can't be attributed to any other cause.

The term pregnancy induced hypertension suggests a disorder of blood pressure that arises because of the pregnancy. Pregnancy induced hypertension complicates around 10% of all pregnancies and is a significant cause for the maternal and fetal mortality and morbidity in the World.⁴ PIH is defined as hypertension (blood pressure ≥140/90 mmHg) with or without proteinuria (≥300 mg/24 hours) emerging after 20 weeks of gestation, but resolving up to 12 weeks postpartum) and is classified as gestational hypertension (GH), preeclampsia (PE), and eclampsia (E).

PIH is a pregnancy specific multisystem disorder characterized by development of oedema, hypertension and proteinuria after 20 weeks of gestation. World Health Organization estimates that at least one woman dies every

seven minutes from complications of hypertensive disorders of pregnancy. Pregnancies complicated with hypertensive disorders are associated with increased risk of adverse fetal, neonatal and maternal outcome including preterm birth, intrauterine growth retardation (IUGR), perinatal death, antepartum haemorrhage, postpartum haemorrhage and maternal death.⁵ Most deaths in PIH occur due to its complications and not due to hypertension per se.

The hypertensive disorders of pregnancy are a leading cause of maternal and perinatal mortality and morbidity in India and internationally. The management of pregnancy induced hypertension is aimed at termination of pregnancy, but this cannot be done in all cases, as most cases are preterm or very preterm. The pregnancy can be prolonged by using antihypertensive agents till a period where in foetal survival is good, there by maximizing the gestational age of infant. The antihypertensive agents have a role in controlling hypertension and there by maternal and foetal complications can be avoided.⁶⁻⁸

Rationale of the study

Pregnancy-induced hypertension is one of the most common disorders seen in human pregnancies. Though relatively benign on its own, in roughly half of the cases the disorder progresses into pre-eclampsia, a dangerous condition that can prove fatal to expectant mothers. Also the fetus is at increased risk for a variety of lifethreatening conditions. Although, various hospital based studies have been done in different parts of the country to estimate the burden of Pregnancy induced hypertension but no such community-based study has been conducted in Kashmir, so this study will be an endeavour to know the incidence of Pregnancy Induced Hypertension (PIH) in Kashmir and chances of its progression to Preeclampsia and eclampsia; so that appropriate measures are being taken to prevent its occurrence and progression and improve the outcome of such cases.

Aims and objectives

- 1. To estimate the incidence of pregnancy-induced hypertension in block Hazratbal, district Srinagar.
- 2. To find out the chances of its progression into preeclampsia and eclampsia.

METHODS

Study design

Community based longitudinal study.

Study period

The study was done for a period of 18 months from April 2015 upto September 2016. During the first 12 months data was collected and during the next 6 months data entry, analysis and write-up was carried out.

Study area

Study was conducted in the field practice area of GMC Srinagar which is block Hazratbal district of Srinagar. Hazratbal block is a semi urban area of Srinagar situated 12 kilometers from the centre of city and is under the administrative control of Department of Community Medicine, Government Medical College Srinagar. It comprises of 65 villages which have been divided into four zones via; Hazratbal, Harwan, Nishat, and Tailbal and the total population of the area are about 75083 (as per block survey report BMO Hazratbal April 2013).

The Hazratbal block is predominately of plain topography but some of the villages have hilly terrain where tribal population is inhabited. The block has four primary Health centres and 12 sub centers.

Sample size estimation

As per the table of estimating the sample size of a study for calculating the incidence rate with a specified relative precision from the manual sample size determination in health studies by Lwanga and Lemeshow, World Health Organization Geneva 1991, using the formula:

$$n = (z_{1-\alpha/2} \div E)$$

Where; n is the sample size, z is 1.96, α is type 1 error, and ε is relative precision.

In this study, keeping relative precision at 10% and confidence level at 95%, the sample size came out to be 385

Selection of sample and data collection

All the pregnant females attending the antenatal clinic at the subcenters and PHCs during the data collection period were included in the study and assessed for eligibility, till the desired number of 385 eligible pregnant females was reached. Blood pressure was checked three times in the right upper arm after making the subject to lie comfortably on the stool and the lowest reading was taken as the blood pressure. A clearance from the ethical committee of GMC Srinagar was sought before the study. Prior to the enrolment of pregnant women, they were apprised of the purpose of the study and then their consent was sought.

Inclusion criteria

An inclusion criterion was all normotensive pregnant women less than 20 weeks of gestation.

Exclusion criteria

Exclusion criteria were any pregnant woman if found hypertensive before 20weeks of gestation; any pregnant woman if found to be already on any prescribed antihypertensive medicine; any pregnant if found to be more than 20 weeks of gestation at baseline examination.

All pregnant women less than 20 weeks of gestation were checked for blood pressure three times in the right upper arm and the lowest reading of the three was taken. The blood pressure of these pregnant women was checked at least once between 16th and 20th week of pregnancy. The pregnant women whose blood pressure was never equal to or more than 140/90 mmHg during their check-ups were included in the study.

For better coverage, the zonal headquarters and their subcentres were visited on the respective antenatal days. All the pregnant women who were identified by ASHA of the respective area and registered at sub-centres and PHCs were covered. Any Pregnant woman, as identified by ASHA, if not registered at the respective health institution was advised to attend the health centre and get herself registered with the help of ASHA of the respective area and any woman if failed to do so due to some reason was visited once between 16 and 20 weeks of pregnancy, and if found normotensive was enrolled in the study, and followed up.

The pregnant women enrolled in the study were examined again around 30 weeks, 37 weeks and once in postnatal period and blood pressure was measured every time using the same procedure. Contact numbers of all the pregnant females enrolled in the study and their respective ASHAs were noted and my contact number was provided to them for any emergency visits to be made, if needed or to clear any other issue.

For recording blood pressure, the woman was made to sit comfortably on a stool after 15 minutes of rest in the waiting area. The blood pressure was recorded in the sitting position by the standardized sphygmomanometer with appropriate cuff size. The cuff was applied on the right arm one inch above the anti-cubital fossa. After tying the cuff, the pulse at the brachial artery was palpated and cuff was inflated 30 mmHg above the point at which pulse disappeared. Then pressure was released slowly about 2-3 mmHg/sec and systolic blood pressure recorded as soon as the first Korotokoff sound was heard, and diastolic blood pressure was recorded where Korotokoff sound disappeared. A rise in the blood pressure to the extent of 140/90 mmHg or more was labelled as hypertension.

All the women whose blood pressure recorded 140/90 mmHg or above at any of the three follow-ups were subjected to urine examination for the presence of proteins in the urine by uri-stick test. The random sample of the urine was requested from the woman explaining her that how to take clean-catch urine sample. Presence of protein ≥ 0.3 gm/l in a clean- catch, mid-stream specimen of urine was labelled as proteinuria.

Any woman who developed hypertension on any of the follow-ups was labeled as pregnancy-induced

hypertension. If hypertension was associated with Proteinuria it was labeled as a case of preeclampsia and if without proteinuria then it was labeled as a case of gestational hypertension. Any pregnant woman with Preeclampsia was referred to PHC Hazratbal for further investigations and management. Any woman suffering from pregnancy-induced hypertension if developed convulsions during antenatal, intra-natal or post-natal period was planned to be labeled as a case of eclampsia and to be immediately referred to nearby first referral unit.

Statistical analysis

The data was entered in the Microsoft excel and analysed using SPSS v16.

RESULTS

The mean systolic blood pressure at baseline, 1st follow-up, 2nd follow-up and postpartum follow-up was 107.56, 113.81, 119.13 and 111.32 mmHg respectively while as mean diastolic blood pressure at baseline, 1st follow-up, 2nd follow-up and postpartum follow-up was 71.84, 75.54, 80.50 and 73.39 mmHg respectively. The baseline, 1st follow-up and 2nd follow-up examinations were conducted at a mean gestational age of 17.87, 29.39 and 36.25 weeks respectively (Table 1).

20% of study subjects developed PIH, majority of them (14.5%) had gestational hypertension and about one-fourth (5.5%) had pre-eclampsia (Table 2).

	Table 1: Dis	stribution of	' continuous	variables	among stud	ly subjects.
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Variable	Number	Minimum	Maximum	Mean	Std. deviation
Period of amenorrhea at baseline (weeks)	385	16	20	17.87	1.267
Systolic BP at baseline (mmHg)	385	82	136	107.56	8.865
Diastolic BP at baseline (mmHg)	385	54	88	71.84	7.356
Period of amenorrhea at 1st follow up (weeks)	385	25	34	29.39	1.867
Systolic BP at 1st follow up (mmHg)	385	88	160	113.81	12.806
Diastolic BP at 1st follow up (mmHg)	385	54	110	75.54	10.826
Period of amenorrhea at 2nd follow up (weeks)	350	31	39	36.25	1.232
Systolic BP at 2nd follow up (mmHg)	350	96	160	119.13	11.071
Diastolic BP at 2nd follow up (mmHg)	350	60	180	80.50	10.278
Postpartum systolic BP (mmHg)	308	90	130	111.32	7.315
Postpartum diastolic BP (mmHg)	308	54	100	73.39	6.729

Table 2: Distribution of study subjects according to outcome.

Outcome		Freque	ency	Percent (%)	Percent (%)		
PIH	Gestational hypertension	77	56	20.0	14.5		
rin	Pre-eclampsia	//	21	20.0	5.5		
No PIH		308		80.0			
Total		385		100.0			

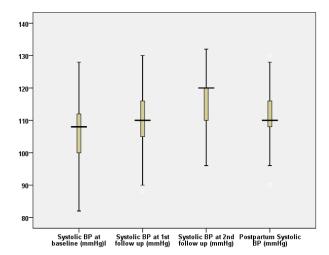


Figure 1: Box plot describing systolic BP at baseline and the 3 follow ups.

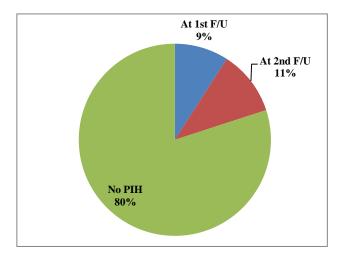


Figure 2: Distribution of study subjects according to development of hypertension at different follow ups.

The median systolic blood pressure of study subjects increased on successive follow-ups during pregnancy but then decreased on postpartum follow-up (Figure 1).

More of the study subjects developed PIH at 2nd F/U (11%) as compared to that of 1st F/U (9%) (Figure 2).

DISCUSSION

Pregnancy is a stressful state and if compounded by hypertension the potential for maternal and fetal adverse outcomes can be immense. Pregnancy induced hypertension (PIH) includes a group of hypertensive disorders developed due the gravid state after 20 weeks of gestation. It includes gestational hypertension, preeclampsia and eclampsia. Hypertensive disorders in pregnancy have been reported to occur as low as 0.51% to as high as 38.4%. PIH complicates approximately 6% of pregnancies globally and is the most important cause of maternal and neonatal morbidity and mortality. 10-12

PIH is a major public health problem all over India. The present study was a prospective study which was conducted to estimate the incidence of PIH in block Hazratbal, which is the field practice area of Government Medical College Srinagar, so that we can get an idea about the magnitude of problem in our community and appropriate interventions can be taken to prevent the adverse outcomes both in mother and the fetus. As the definition of PIH mentions the development of hypertension after 20th week of gestation in a previously normotensive female, a cross-sectional study could not have given the exact diagnosis and would have wrongly overestimated or underestimated the burden of disease; depending upon the time of gestation the examination was done. The study area was selected because it is under the administrative control of Department of Community Medicine (SPM), GMC Srinagar and better cooperation was expected in the process of study from all the health care workers as well as the community.

Every pregnant woman was examined for blood pressure between 16 to 20 weeks of gestation at least once and enrolled in the study only if found normotensive, in order to fit in the definition of PIH and to rule out chronic hypertension. The follow up examinations were conducted around but not exactly on 30th week, 37th week and once in postpartum; because of feasibility. 20% of study subjects developed PIH, majority of them (14.5%) had Gestational Hypertension and about one-fourth (5.5%) had pre-eclampsia. More of the study subjects developed PIH at 2nd F/U (10.9%) as compared to that of 1st F/U (9.1%).

The incidence of PIH in India is estimated to be 15.2%.¹³ The incidence of PIH in our study was 20% which is much higher than the national levels, the reasons could be multiple. Firstly the eating habits of Kashmiri people are different from rest of the India, partly because of different culture and customs and partly because of the different

weather. Kashmiri people consume more oftenly non-vegetarian foods (especially the traditional wazwan) and salted tea (noon chai) which adds to their salt consumption. Also because of the cold weather and snow during winters the valley gets separated from the rest of country at times and the local agricultural activities are halted so that the supply of fresh vegetables is seriously hampered. So people here use pickles and dried salted vegetables in winters as an alternative. Also consumption of smoked fish (Ferri) is also an old tradition, especially in the areas surrounding the Dal Lake. All these factors result in the overall increased salt consumption by Kashmiris which can be a contribution for the overall increased average blood pressures in Kashmiri population and also for the increased incidence of PIH.

Srinagar is situated at an altitude of around 6070 feet from the sea level which is very much higher than most of the states of India. This can also contribute to the higher incidence of PIH as per a retrospective study by Moore et al has shown high altitude as a significant risk factor for PIH. The incidence of gestational hypertension was 14.5%, which again is higher than the national and global estimates and can be explained in the same way.

The incidence of pre-eclampsia was 5.5% which is slightly higher than the pooled incidence of developing countries (3.4%) as per the GBD 2000 report but lower than the national incidence of 8 to 10% (National health portal of India).

The incidence of eclampsia was 0% (there was no case of eclampsia found among the study population), which lies within the range of 0.05% to 1% in developing countries. A zero% incidence should not be confused with overall absence of eclampsia cases in the valley because our study was not powered enough to estimate the incidence of eclampsia.

Strengths of the study

- In order to estimate the incidence of a disease we have to follow up the participants and look for the development of disease. Most of the studies conducted across the country were cross-sectional studies and will only give prevalence of PIH rather than the true incidence. Our study is a longitudinal (follow up) study and will give the true incidence of PIH
- Our study is a prospective cohort study rather than a retrospective cohort study like the most other longitudinal studies done so far. This eliminates the chance of recall bias and also increases the validity of measurements, thus giving a more accurate estimation of incidence of PIH.
- There is no chance of selection bias in our study because the ANC registration at the corresponding sub-centers is almost 100% and every pregnant lady had an equal chance of being included in the study. Even the females belonging to higher SES who

- prefer private hospitals over government hospitals also get registered at their corresponding sub-centers and were included in the study.
- The blood pressure was measured using the same validated sphygmomanometer, by the same person and following the same protocol every time. This decreases the chances of inter-instrument, intraobserver and inter-observer variations thus minimizing the chances of errors in the measurement of blood pressure.

Limitation of the study

There is a possibility that our study has slightly overestimated the incidence of PIH because as per the definition of PIH, the subject has to be followed up to 12 weeks after delivery and if the blood pressure does not return to normal, diagnosis of PIH is changed into chronic hypertension. But in our study because of time constrains the subjects were not followed up to 12 weeks. But the resulting difference would not be significant because the 12 weeks follow up is made in order to recognize those females who were already hypertensive before 20 weeks of gestation and were wrongly labeled as PIH. In our study every female was screened for hypertension at 16 to 20 weeks at least once and only those females were taken into the study that was normotensive at that stage.

CONCLUSION

- Pregnancy-induced hypertension (PIH) is common among Kashmiri females, 20 out of 100 pregnant females develop PIH.
- PIH includes a group of hypertensive disorders developing due the gravid state after 20 weeks of gestation which include gestational hypertension, pre-eclampsia and eclampsia.
- PIH is a major cause of perinatal mortality, preterm delivery, IUGR, and maternal morbidity and mortality.

Recommendation

Awareness about PIH among females and health care workers must be generated so as to prevent its occurrence, lead to early diagnosis and management and prevent its progression and complications so that maternal and fetal outcome is improved.

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Ethical approval: The study was approved by the

Institutional Ethics Committee of GMC Srinagar

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