WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 12, 2106-2118. Research Article ISSN 2277– 7105

A STUDY ON PREVALENCE, RISK FACTORS AND PRESCRIPTION PATTERN OF PREGNANCY INDUCED HYPERTENSION

Aleena Kurian[1]*, Merin Raju[1], Shilpa S. Pillai[1], Suhail P.[1], Christeena James[2], Veeresh Babu D.[2] and Smitha B Rao[3]

[1]Shree Devi College of Pharmacy, Mangaluru.

[2]Assistant Professor, Shree Devi College of Pharmacy, Mangaluru.

[2]HOD, Department of pharmacy Practice, Shree Devi College of Pharmacy, Mangaluru.

[3]Yenepoya Medical College Hospital, Mangaluru.

Article Received on
21 July 2022,

Revised on 11 August 2022,
Accepted on 01 Sept. 2022

DOI: 10.20959/wjpr202212-25451

***Corresponding Author**
Aleena Kurian
Shree Devi College of Pharmacy, Mangaluru.

ABSTRACT

Introduction: Pregnancy induced hypertension (PIH) is one the major problem encountered in pregnancy and also a leading cause for maternal mortality and morbidity. It has been classified into various types according to its severity. Diagnosis of PIH is done by monitoring the blood pressure (BP) and confirmed if it is above 140/90mmHg. . So identification of demographics of PIH is of great importance in the present health scenario to understand more about the condition. **Objectives:** To study the prevalence, risk factors and prescription pattern of pregnancy induced hypertension. **Methods:** This was a prospective observational study conducted in Obstetrics and Gynaecology department of Yenepoya Medical College Hospital, Derlakatte for a period of six months. **Results:** Out of 971 patients 37 were diagnosed with PIH and prevalence was 4.68%. Among the cases 17.57% were having an increased maternal age and 18.91% were having increased body mass index (BMI). Family history and previous history of PIH were present in 43.24% and 18.91% of PIH women respectively. The most common drug prescribed was Nifedipine (25.74%) which was followed by labetalol (21.78%). **Conclusion:** The study concludes that an increased age and BMI, previous history of PIH, family history of PIH etc. contributes to the development of PIH**.** Identifying risk factors at an early stage and proper management of hypertensive disorders of pregnancy will be beneficial in providing better patient care and minimizing further complications.

KEYWORDS: Pregnancy induced hypertension; body mass index; risk factors; prescription pattern.

INTRODUCTION

Pregnancy is a time of profound physiological changes in a woman's body which challenges the clinicians in managing the disease states and selection of medications best suited to treat them. Careful consideration of the benefit to the mother and the risk to the fetus is required while prescribing drugs during pregnancy.[1] Hypertension is the most common medical problem encountered in pregnancy and remains an important cause of maternal and fetal morbidity and mortality.[2]Pregnancy induced hypertension (PIH) is defined as blood pressure (BP) ≥140/90 mmHg, taken after a period of rest on two occasions or ≥160/110 mmHg on one occasion in a previously normotensive woman.[3]Many a times, PIH develops during second half of pregnancy, usually after 20th week, but it can also develop at the time of delivery or right after delivery.[4]

In India >8% maternal deaths occur due to HDP which include PE and eclampsia. Chronic hypertension affects 1 to 5% of pregnancies, PIH affects 5 to 10% of all pregnancies and is more common in 1st pregnancy up to 25%.[7] The incidence of PIH in primigravidae is 16% and 7% in multigravidae.[4]

Hypertensive disorders during pregnancy are classified into 4 categories: 1) chronic hypertension, 2) preeclampsia-eclampsia, 3) preeclampsia superimposed on chronic hypertension, and 4) gestational hypertension (transient hypertension of pregnancy or chronic hypertension identified in the latter half of pregnancy).[2]

Although the cause of PIH is unknown, certain factors are known to increase the risk of PIH. Factors that increases the risk include pregnant women younger than 20 years and those older than 40 years, nulliparity, women with multiple fetuses, multiple pregnancies, previous episodes of PIH, more than 5 years since last gestation, family history of PIH, elevated body mass index (BMI), maternal BP ≥140 /90mmHg.[8-10]Adverse outcomes related to hypertension in pregnancy can be divided into short-term versus long-term complications. While short-term complications can be further sub grouped into maternal and fetal complications, long-term outcomes are mainly maternal. The objective of treating hypertension in pregnancy is to protect the woman from dangerously high BP and to permit continuation of the pregnancy, fetal growth and maturation.[11]

Study of Prescription Pattern: The study of prescribing pattern is a component of medical audit which seeks monitoring in the prescribing practices of the prescribers to achieve rational and cost effective medical care.[7] It reflects the physician's attitude towards the disease and role of drugs in its treatment and their therapeutic knowledge. Moreover it also helps in monitoring, evaluation and necessary modifications in prescribing practices to achieve a better medical care.

Identifying high risk women during the early period of pregnancy will be valuable for the prevention and certain management of the aforementioned pregnancy complications.[12] As pera recent data provided by a market research firm, drugs used for gynaecological disorders are oneof the highest selling drugs and rank eighth overall. However they are the least studied drugs in terms of their prescribing patterns.[19] Thus this study will be conducted to establish the prevalence and to assess risk factors as well as prescription pattern of PIH among women seeking maternity services inYenepoya Medical College and the result of the study will be usefulin providing better patient care in future management of PIH.

METHODOLOGY

Study design: A prospective observational study.

Study site: The study was conducted at Obstetrics and Gynaecology department of Yenepoya medical college hospital, Derlakatte.

Study period: The study was conducted over a period of six months.

Study subjects: The patients who were admitted in the inpatient department of the study site during six months of the study period who satisfied the following inclusion criteria were eligible for the enrollment.

Inclusion criteria

- Pregnant women of all ages.
- Both primi and multi gravida women irrespective of their trimester.
- Patients who are willing to participate in study.

Exclusion criteria

- Who are very ill and unable to participate in interview.
- Pregnant women who are not willing to give consent.
- Pregnant women with incomplete data on dependable variables of the study.
- Pregnant women with chronic hypertension, diabetes mellitus, auto-immune disorders,

chronic nephritis or any other cardiovascular diseases.

Ethical approval

The study was approved by the Institutional Ethical Committee of Yenepoya medical college hospital, Derlakatte.

Vide number: YUEC572/2017

Sources of data

- Medical records of the patients.
- Patient interviews

Study procedure

- All the patients who were presented to the Obstetrics and Gynaecology in- patient departments of the hospital were reviewed daily to identify the patients diagnosed with PIH.
- The patients who met the study criteria were enrolled in the study.
- Ethical clearance from Yenepoya University Ethics Committee was obtained prior to the study.
- The subjects included in the study were categorized as those with PIH and those without PIH. A suitably designed data collection form was prepared to collect the details of the patients. The data collection included details of the patient like age, gestational age, BMI, gravida, parity, time gap between pregnancies, BP status, previous history of deliveries, family history of PIH, blood group, Rh status and treatment given to the patient.
- Obtained patient information was documented in a suitably designed individual case record form.

Statistical analysis

The data were entered in Microsoft excel version 13 and analyzed by using GraphPad Prism version 5. Chi square test was used to assess risk factors of PIH. Categorical data were analyzed by descriptive statistics and inferential statistics.

RESULTS AND DISCUSSION

Prevalence of PIH

A total of 791 pregnant women were included in the study out of which 37 were identified with PIH and the prevalence was found to be 4.68%. The prevalence of pregnant women

without PIH was 95.32%.

Table 1: Distribution of PIH in study population (n= 791).

PIH	Frequency	Percentage (%)
Yes	37	4.68
No	754	95.32
Total	791	100

Demographic distribution of the study subjects

Age of the subjects ranged from 19-37 and the mean age was 27.20 ± 4.79.

Table 2: Age-wise distribution of the study subjects (37 PIH + 37 non PIH).

Age in years	Frequency	Percentage (%)
<20	5	6.76
20-25	27	36.49
26-30	27	36.49
>30	15	20.27

Association between PIH and age group

Statistical significant association was found between PIH and age group (p= 0.0004 <0.05).

Table 3: Distribution of age among PIH and non-PIH women (n= 74).

Age Group	PIH		Total n (%)	χ^2	p Value
	Yes	No			
	n (%)	n (%)			
< 20 yrs	5 (6.76)	0 (0)	5 (6.76)	18.47	0.0004
20-25 yrs	8 (10.81)	19 (25.68)	27 (36.49)		
26-30 yrs	11 (14.86)	16 (21.62)	27 (36.48)		
> 30 yrs	13 (17.57)	2 (2.70)	15 (20.27)		

Association between PIH and BMI

Statistical significant association was found between PIH and body mass index (p=0.0001<0.05).

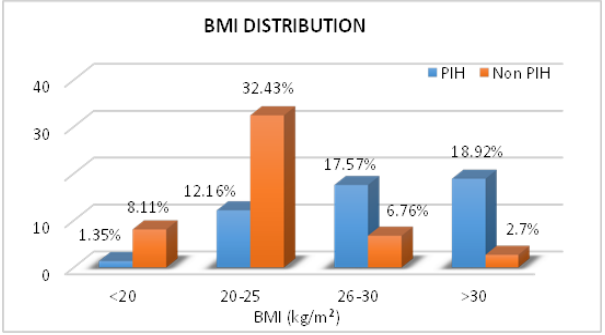

Figure 1: Distribution based on BMI among subjects.

Association between PIH and a previous history of PIH

A significant association was found between previous history of PIH and PIH (p=0.0007 <0.05). Out of 37 women with PIH, 14 (37.84%) were having a previous history. But in women withoutPIH, only 2 (5.40%) had a history of PIH.

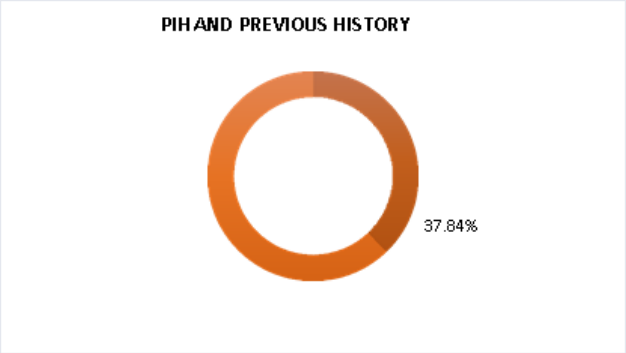

Figure 2: Distribution of previous history of PIH among cases.

Association between PIH and family history of PIH

Significant association was found between PIH and family history of PIH (p=0.0005<0.05). In PIH group 16 (43.24%) had family history of PIH but only in 3 (8.11%) from non PIH group hadsuch history.

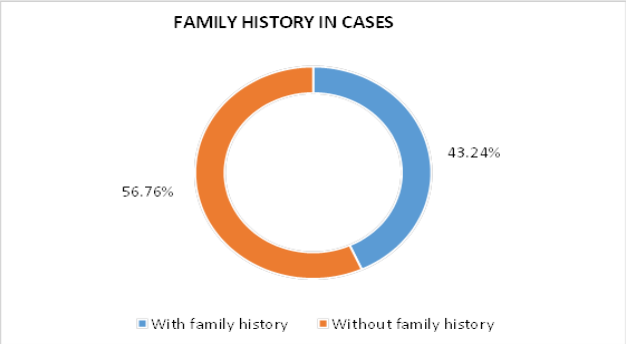

Figure 3: Distribution of family history of PIH among cases.

Association of Gravida and PIH

Association between gravida and PIH was found to be statistically insignificant.

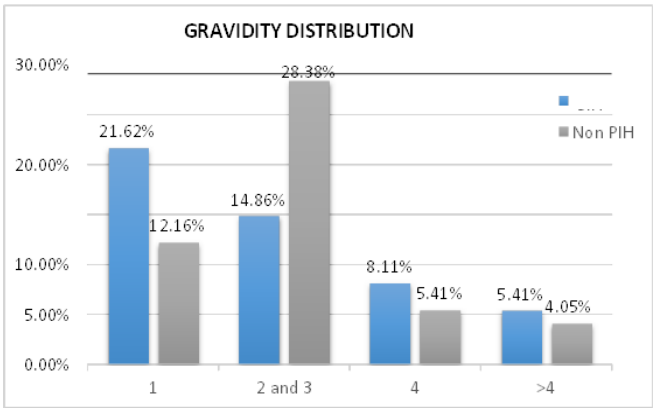

Figure 4: Gravidity wise distribution among subjects.

Association between time gap between pregnancies and PIH

Association between PIH and time gap between pregnancies was found to be statistically insignificant. From entire study subjects 17 (22.97%) were having time gap between pregnancies ≥5 among which 11(64.70%) developed PIH and the remaining (35.3%) fell under non PIH category. A total of 32 women were primi gravid and the probability of developing PIH was equal (50%) in both the PIH and non PIH group.

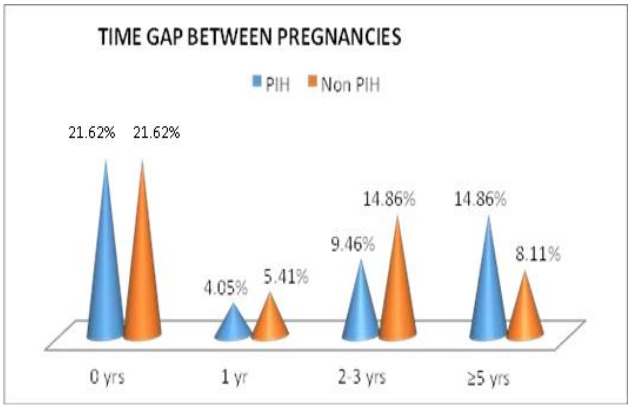

Figure 5: Time gap between pregnancies among subjects.

Association between PIH and History of abortion

Association between history of abortion and development of PIH was found to be statistically insignificant. In total subjects, 12 (16.21%) had a previous history of abortion out of which 8 (66.67%) presented with PIH and 29 (39.18%) out of total subjects developed PIH without having history of abortion.

Classification according to blood pressure

The total subjects having PIH were categorized into three according to their blood pressure.

Table 4: Distribution of cases according to blood pressure (n= 37).

Blood Pressure (mmHg)	No. of Subjects	Percentage (%)
Mild (140-149/90-99)	13	35.14
Moderate (150-159/100-109)	11	29.73
Severe (≥160 / ≥110)	13	35.14

Prescription pattern of drugs

A total of 101 drugs were prescribed among 37 cases which included antihypertensive drugs (54.46%), vitamin and mineral supplements (30.70%) and miscellaneous (14.85%) drugs. The supplements that were widely given to the patients were capsule Autrin, a combination of folic acid, ferrous fumarate and vitamin B12 and tablet Shelcal containing calcium carbonate. All the drugs other than anthypertensives and supplements were classified under miscellaneous which mainly included aspirin, pantoprazole etc.

Table 5: Distribution of drugs prescribed.

Drugs	Frequency	Percentage (%)
Antihypertensives	55	54.46
Supplements	31	30.70
Miscellaneous	15	14.85

Prescribing pattern of antihypertensive drugs

In majority of the cases single drug therapy (64.86%) was prescribed which was followed by twodrug therapy (21.62%) and only in few, three drug therapy (13.51%) was given.

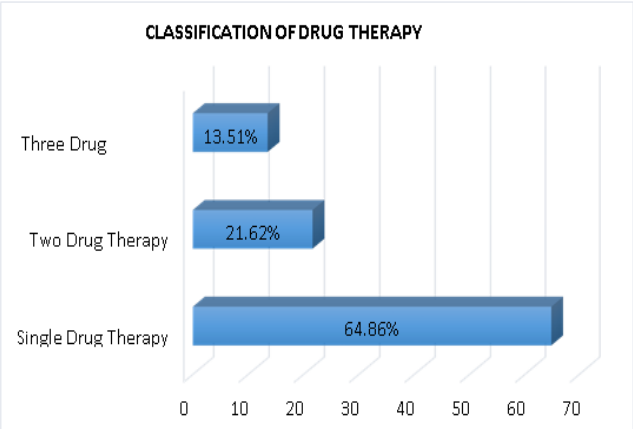

Figure 6: Utilisation pattern of Anti-hypertensive drugs in PIH patients Anti-hypertensive drugs Used and Prescribing frequency.

Among five different anti-hypertensives given, nifedipine (47.27%) was prescribed most often which was followed by labetalol (40%). In few cases magnesium sulphate (10.91%) and in a single case methyldopa (1.82%) were given.

Table 6: Prescription pattern of Anti-hypertensives in PIH patients.

Drugs given	Prescribing frequency	Percentage (%)
Labetalol	22	40
Nifedipine	26	47.27
Magnesium sulphate	6	10.91
Methyldopa	1	1.82

Classification according to Generic and Brand name

Out of 101 drugs given for PIH women, majority was prescribed in their brand names (72.28%) and only 27.72% was in generic name.

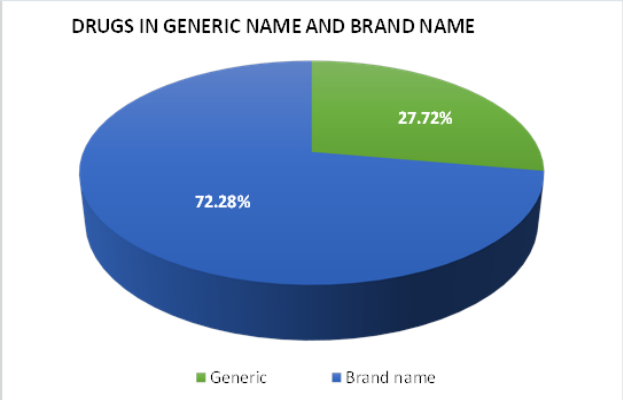

Figure 7: Prescription by generic Name and Brand name.

FDA classification of antihypertensive drugs

In pregnant women with PIH, drugs belonging to FDA category C (55.14%) were mostly prescribed followed by category D (9.90%) and B (6.93%). 29.70% of prescribed drugs were not assigned to any FDA category.

Table 7: Distribution of drugs according to FDA category.

Category	No. of drugs	Percentage (%)
A	1	0.99
B	7	6.93
C	53	55.14
D	10	9.90
Unclassified	30	29.70

Drug use indicators

Table 8: Assessment of drug use pattern using WHO indicators.

Indicators	Data
Total number of prescriptions	37
Total number of drugs prescribed	101
Average number of drugs / prescription	2.73

Total number of anti-hypertensives prescribed	55
Average number of anti-hypertensives /prescription	1.49

Hypertension complicates about 5-20% of pregnancies world-wide.[6] The prevalence of HDP varies among different geographic regions, races, socioeconomic status and some other factors such as age and parity and ranges from 6.4% in African Americans and 5.22% in Chinese population.[2,15] In our study, the prevalence of PIH was found tobe 4.68% which was lower than the prevalence (7.8%) according to another study donein Indian population by **Sajith *et al.***[2]

Maternal age is considered as an important risk factor in development of PIH. According to US nation-wide data, for each additional year above 34 years, the risk ofdeveloping PIH increases by 30%.[14] We observed a statistically significant associationbetween increased maternal age andPIH which was supported by the study of **ShiozakiA et al.**[9] In our study pregnant women withage >30 years were at higher risk of developing PIH as 13 (35.14%) out of 37 PIH women wereunder this age group. But, in contrary to our study results, **Saxena *et al,*** noted that pregnant women of age <25 years were more vulnerable to develop PIH where there was an equal distribution of pregnant women with PIH and without PIH among all other age groups.[14]

With increasing BMI, the threat of PIH also increases. There is a 2-4.5 fold increase inthe riskof PE in over-weight and obese women. In a cross sectional study conducted by **Ahmed SS *et al,***[13] a significant association between the risk of developing HDP and BMI ≥27kg/m^2 had drawn and the result of our study was consistent with the same. In our study, underweight, normal, overweight and obese PIH women were 2.70%, 24.32%, 35.14% and 37.84% respectively whereas majority of the non PIH women were having normal BMI thereby putting them under lower risk of PIH.

In our study, a strong statistically significant association was established between history of HDPand PIH and also among family history of PAH and PIH were out of 37 PIH women, 14 (37.84%) had a previous history and 16 (43.24%) had family history of PIH. Tebeu et al.[16] conducted a case-control study in which the aforementioned associations were present. But in another study done by Ahmed SS et al., only the association of PIH with family history of HDP was seen significant. Pregnant women are 3 times more likely to develop PIH if their mothers had a history of PIH.[13]

PIH cases with primigravida were 43.24% and those with gravidity >4 were only 10.81% in our study and we observed a decline in the frequency of PIH with increase in gravidity but the variability in gravidity between PIH and non-PIH women was statistically insignificant. Our study correlates with the result of a prospective casecontrol study by Saxena et al. where the prevalence of primigravid PIH cases was57.14%.[14]

A long time gap between pregnancies results in higher incidence of PE. In comparison with women who had PE during first pregnancy, those who did not have such history were at lower risk of developing PE or HDP even after eight years of time gap between pregnancies according to the study carried out by Dı´az H S et al.[17] Similar result was observed in our study too, indicating no significant relation between time gap between pregnancies and PIH. Out of 37 PIH women, 8 (21.62%) had history of abortion, however no significant connection with the development of PIH was noticed in our study.

All the pregnant women with PIH in our study were classified into three categories - mild, moderate and severe according to their BP range and included 29.73% of moderate PIH women whereas an equal distribution of cases were seen in both mild and severe (35.14%) category.

The prescribing pattern of anti-hypertensive drugs in our study was similar with another Indian study carried out by **Dutta *et al,*** [7] in which single drug therapy was prescribed for majority of the patients (58%).Prescribing under generic name is considered economical and rational[18] butin our study about 3/4th of the drugs were prescribed in their brand name. Only 27.72% of the drugs prescribed were in their generic names.

Our study showed that more than half of the prescriptions were comprised of category C drugs (52.48%) which was followed by drugs in D (9.90%) and B (6.93%) category and only 0.99% of drugs belonging to category A were present.

Analysis of prescription was done using drug use indicators. The average number of 2.73 drugs per prescription in the present study was less than that reported by other studies conducted by **Dutta *et al,*** [7] and **Deb *et al,*** [5] where the average number of drugs were 4.28 and 4.2 respectively. But the average number of anti-hypertensives prescribed in our study was 1.49 which was in accordance with those studies. When many drugs are prescribed simultaneously, it may lead to increased therapeutic cost and increased risk of drug

interactions. So it is better to keep the mean number of drugs as low as possible.

CONCLUSION

Pregnancy induced hypertension is one of the leading causes of maternal and neonatal mortality and morbidity. The prevalence of PIH in the study population was 4.68%. Increased maternal age and BMI, family history and previous history of PIH were observed to have a significant association with the development of PIH. Identifying risk factors at an early stage and proper management of HDP will be beneficial in providing better patient care and minimizing further complications. In our study, monotherapy was highly preferred. The most commonly prescribed antihypertensive drug was nifedipine which belongs to FDA category C.

ACKNOWLEDGEMENTS

We sincerely acknowledge the efforts of all those who have directly or indirectly have lent theirhelping hand in completing our project successfully.

REFERENCES

1. Gupta N, Agarwal M, Nayeem M, Safhi MM, Makeen HA, Sumaily JM.Prescribing pattern of drugs in the department of obstetrics and gynecology in expecting mothers in Jazan region, KSA. Int J Pharm Pharm Sci, 2014; 6(1): 658-61.
2. Sajith M, Nimbargi V, Modi A, Sumariya R, Pawar A. Incidence of pregnancy induced hypertension and prescription pattern of antihypertensive drugs in pregnancy. Int J Pharm Sci Res, 2014; 5(4): 163-70.
3. Mutti M, Bangure D, Tshimanga M, Notion GT, Chonzi P. Prevalence of pregnancy induced hypertension and pregnancy outcomes among women seeking maternity services in Harare, Zimbabwe. BMC Cardiovasc Disord, 2015; 15: 111-9.
4. Kaur A, Amarbir R, Sudersan S. Pregnancy induced hypertension: A reterospective study of 200 cases of pregnant women. J Dent Med Sci, 2016; 15(6): 36-43.
5. Divyashree N, Divya VJ, Bhattarai T, Sasidhar J. Prescription pattern of drugs in pregnancy induced hypertension in a tertiary care hospital. Asian J Pharm Tech Inno, 2017; 5(22): 1-5.
6. Deb T, Ghosh A, Bhadra B. Drug utilization study in pregnancy induced hypertension in a tertiary care teaching hospital. J Drug Deliv Ther, 2014; 4(2): 169-72.
7. Dutta A, Handique C, Lahkar M. Evaluation of prescription pattern in hypertensive pregnant women attending the department of obstetrics and gynaecology of Gauhati

medical college and hospital. World J Pharm Pharm Sci, 2016; 6(11): 1123-31.

8. Singh V, Srivastava M. Associated risk factors with pregnancy-induced hypertension: a hospital-based KAP study. Int J Med Public Health, 2015; 5(1): 59-62.
9. Shiozaki A, Tanaka T, Ito M, Sameshima A, Inada K, Yoneda N, Yoneda S, SatohS, Saito S. Prenatal risk assessment of gestational hypertension and preeclampsia using clinical information. Hypertension Research in Pregnancy, 2016; 4(2): 74-87.
10. Brien TEO, Ray JG, Chan W. Maternal body mass index and the risk of preeclampsia: a systematic review. Epidemiol, 2003; 14(3): 368–74.
11. Hoover C, Briggs GG, Freeman RK, Yaffe SJ. Drugs in pregnancy and lactation: a reference guide to fetal and neonatal risk. J Midwifery & Women's Health, 2003; 48(4): 294-9.
12. Muto H, Yamamoto R, Ishii K, Kakubari R, Takaoka S, Mabuchi A, Mitsuda N. Risk assessment of hypertensive disorders in pregnancy with maternal characteristics in early gestation: a single center cohort study. Taiwan J Obstet Gynecol, 2016; 55: 34.
13. Ahmed SS, Sultana N, Begum ML, Lima LS, Abedin F. Pregnancy induced hypertension and associated factors among pregnant women. J Gynecol Women's Health, 2017; 3(4): 1-6.
14. Saxena S, Srivastava PC, Thimmaraju K V, Mallick AK, Dalmia K. Sociodemographic profile of pregnancy induced hypertension in a tertiary care centre. Sch J App Med Sci, 2014; 2(6): 3081-6.
15. Ye C, Ruan Y, Zou L, Li G, Li C, Chen Y, et al. The 2011 Survey on hypertensive disorders of pregnancy in China: prevalence, risk factors, complications, pregnancy and perinatal outcomes. PloS ONE, 2014; 9(6): e100180.
16. Tebeu PM, Foumane P, Mbu R, Fosso G, Biyaga PT, Nelson J, et al. Risk factors for hypertensive disorders in pregnancy: a report from the Maroua regional hospital, Cameroon. J Reprod Infertil, 2011; 12(3): 227-34.
17. Herna´ndez-Dı´az S, Toh S, Cnattingius S. Risk of pre-eclampsia in first and subsequent pregnancies: prospective cohort study. BMJ, 2009; 338: b2255.
18. Sharma P, Kapoor B. Study of prescribing pattern for rational drug therapy. J Med Edu Res, 2003; 5(3): 107-9.
19. Kolasani PB, Sasidharan P, CM D. A prospective study of prescribing pattern of drugs among in patients of gynaecology department in a tertiary care teaching hospital in South India. Int J Basic Clin Pharmacol, 2016; 5(4): 1321-6.