

ORIGINAL ARTICLE**Pregnancy Induced Hypertension and Associated Factors among Women Attending Delivery Service at Mizan-Tepi University Teaching Hospital, Tepi General Hospital and Gebretsadik Shawo Hospital, Southwest, Ethiopia****Tesfaye Abera Gudeta^{1*}, Tilahun Mekonnen Regassa²****OPEN ACCESS**

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ABSTRACT

BACKGROUND: Disorders of pregnancy induced hypertensive are a major health problem in the obstetric population as they are one of the leading causes of maternal and perinatal morbidity and mortality. The World Health Organization estimates that at least one woman dies every seven minutes from complications of hypertensive disorders of pregnancy. The objective of this study is to assess pregnancy induced hypertension and its associated factors among women attending delivery service at Mizan-Tepi University Teaching Hospital, Gebretsadikshawo Hospital and Tepi General Hospital.

METHODS: A health facility based cross-sectional study was carried out from October 01 to November 30/2016. The total sample size (422) was proportionally allocated to the three hospitals. Systematic sampling technique was used to select study participants. Variables with p-value of less than 0.25 in binary logistic regression were entered into the multivariable logistic regression to control confounding. Odds ratio with 95% confidence interval was used. P-value less than 0.05 was considered as statistically significant.

RESULTS: The prevalence of pregnancy induced hypertension was 33(7.9%); of which 5(15.2%) were gestational hypertension, 12 (36.4%) were mild preeclampsia, 15(45.5%) were severe preeclampsia and 1 (3%) eclampsia. Positive family history of pregnancy induced hypertension [AOR5.25 (1.39-19.86)], kidney diseases (AOR 3.32(1.04-10.58)), having asthma [AOR 37.95(1.41-1021)] and gestational age (AOR 0.096(0.04-.23)) were predictors of pregnancy induced hypertension.

CONCLUSION: The prevalence of pregnancy induced hypertension among women attending delivery service was 7.9%. Having family history of pregnancy induced hypertension, chronic kidney diseases and gestational age were predictors of pregnancy induced hypertension.

KEYWORDS: Pregnancy induced hypertension, associated factors, delivered women, MTU

INTRODUCTION

Hypertension in pregnancy is a systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg or both. Both systolic and diastolic blood pressure raises are important in the identification of Pregnancy induced hypertension (1). Pregnancy induced hypertension (PIH) is hypertension that occurs after 20 weeks of gestation in women with previously normal blood pressure. The broad classification of pregnancy-induced hypertension during pregnancy is gestational hypertension, pre-eclampsia and eclampsia (2).

Severe preeclampsia in pregnancy is a systolic blood pressure ≥ 160 mmHg or diastolic blood pressure ≥ 110 mmHg or both. Eclampsia is a severe type of pregnancy induced hypertension, and it happens in about one in 1,600 pregnancies and develops near the end of pregnancy (4). The three primary characteristics of pregnancy induced hypertension conditions are high blood pressure, protein in the urine and pathologic edema (3-5).

Pregnancy induced hypertension is a major contributors to maternal and perinatal morbidity and mortality. In the United States, about 15% of maternal deaths are attributable to hypertension, making it the second leading cause of maternal mortality. Severe hypertension increases the mother's risk of cardiac failure, heart attack, renal failure and cerebral vascular accidents. In addition, the fetus is at increased risk from complications like poor placental transfer of oxygen, growth restriction, preterm birth, placental abruption, stillbirth and neonatal death (2). Hypertensive disorders represent the most common medical complications of pregnancy with a reported incidence of 5-10% (6,7).

Globally, preeclampsia is a leading cause of maternal and neonatal mortality and morbidity, predominantly in developing countries. The disorder is usually diagnosed in late pregnancy by the presence of high blood pressure with proteinuria and/or edema. Prevention of any disease process needs awareness of its prevalence, etiology and pathogenesis (8). The World Health Organization estimates that at least one woman dies every seven minutes from complications of

pregnancy induced hypertension disorders. Pregnancy complicated with hypertensive disorder is related with increased risk of adverse fetal, neonatal and maternal outcome (9).

Null parity, multiple pregnancies, history of chronic hypertension, gestational diabetes, fetal malformation, obesity, extreme maternal age (less than 20 or over 40 years), history of PIH in previous pregnancies and chronic diseases like renal disease, diabetes mellitus, cardiac disease, unrecognized chronic hypertension, positive family history of PIH which shows genetic susceptibility, psychological stress, alcohol use, rheumatic arthritis, extreme underweight and overweight, asthma and low level of socioeconomic status are the risk factors for PIH (5,10,11). According to a study in South Africa, the incidence of hypertensive disorders of pregnancy was 12%, and it was the commonest cause of maternal death which contributed 20.7% of maternal deaths (12).

As the Ethiopian Demographic Health survey (EDHS) 2016 reported, maternal mortality ratio is 412 deaths per 100,000 live births, and pregnancy induced hypertension has a countless role for this maternal death (13). A review study conducted on the causes of maternal mortality in Ethiopia indicated that the proportion of maternal mortality in Ethiopia due to hypertensive disorders between the year of 1980 and 2012 was in an increased trend from 4%-29% (14).

The Federal Ministry of Health has applied multi-pronged approaches to reducing maternal and newborn morbidity and mortality by improving access to and strengthening facility-based maternal and newborn services but the maternal morbidity and mortality due to pregnancy induced hypertension was in an increasing trend (15).

Despite the fact that pregnancy induced hypertension is a leading causes of maternal morbidity and mortality during pregnancy, little is known about the current magnitude of PIH, its associated factors among women attending delivery service in Ethiopia and specifically in study areas. Therefore, the objective of this study was to assess pregnancy induced hypertension and its associated factors among women attending

delivery service at Mizan Tepi University Teaching Hospital, Gebretsadikshawo Hospital and Tepi General Hospital, Southwest Ethiopia.

MATERIALS AND METHODS

Study area and period: The study was conducted in Mizan Tepi University Teaching Hospital, Tepi General Hospital and Gebretsadikshawo Hospital found in Benchi Maji, Sheka and Kefa zones from October 01-November 30/2016. Mizan Tepi University Teaching Hospital is located in Bench Maji Zone 560 kms far from Addis Ababa, and Gebretsadikshawo is found 441 kms from Addis Ababa in Kefa Zone and Tepi General Hospital is located in Sheka Zone 565 kms from the capital city of Ethiopia, Addis Ababa.

Study design: Health facility based cross-sectional study design with quantitative data collection method was used.

Source and study population: All women who attended delivery service in Mizan Tepi University teaching Hospital, Tepi General Hospital and Gebretsadikshawo Hospital were considered as source population whereas all sampled women were considered as study population.

Inclusion and exclusion criteria: All admitted women in delivery ward with gestational age

greater than 28 weeks were included to the study whereas women with known chronic hypertension and those who were critically ill and unable to communicate after full course of treatment were excluded from the study. A woman who was critically ill due to PIH was waited until she recovered from her illness.

Sample size and sampling technique: The sample size was calculated by using a single population proportion sample size calculation formula by considering the following assumptions: d = margin of error of 5% with 95% confidence interval and $P=50%$ in order to maximize the sample size. By considering 10% none response rate, the final sample size became 422.

The total sample size was proportionally allocated to the three public hospitals based on their source population from each hospital. The source population of each hospital was taken from six-month delivery reports. Then, the average was considered as source population (1030). Afterwards, the study participants were systematically selected from each hospital, and admitted mothers for delivery who were eligible to the study were included until the required sample size was obtained (Figure 1).

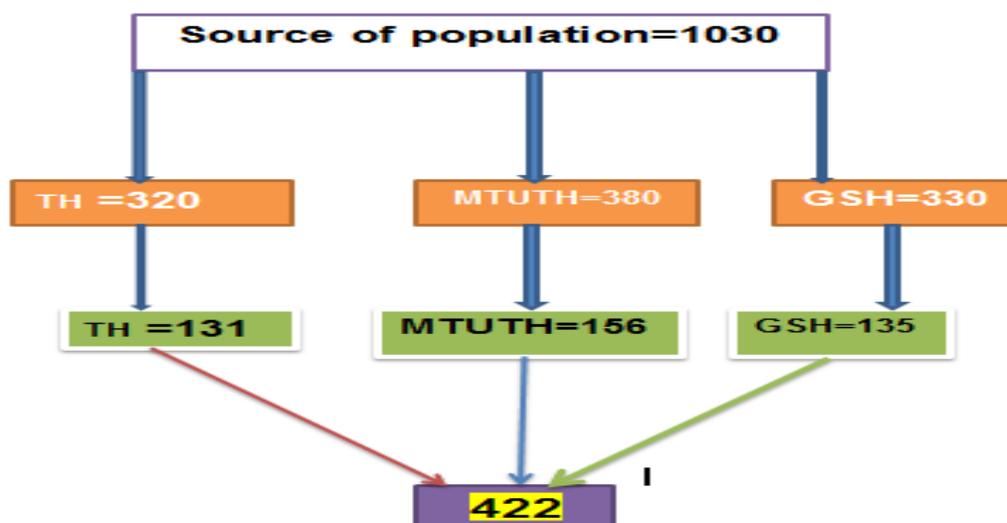


Figure 1: Schematic presentation of sampling procedure

Pregnancy induced hypertension (PIH): A pregnant women attending delivery service with high blood pressure ($\geq 140/90$ mmHg) after 28 weeks of gestation was measured two times six hours apart by trained data collectors and with or without proteinuria. The diagnosis of PIH was confirmed by a physician working in labour ward. Pregnancy induced hypertension includes gestational hypertension, pre-eclampsia and eclampsia.

Psychological stress: A woman who scored greater than the mean score was considered as psychologically stressed.

Data collection instruments: The data was collected by using pre-tested structured questionnaire adapted from a validated questionnaire (16,17). The questionnaire was first adapted in English and translate into Amharic by an expert and translated back to English to see the consistency of the item. The questionnaire contains sections for assessing demographics and associated factors. The questions and statements were grouped and arranged according to the particular objectives that they were aimed to address. Six data collectors who were degree-holding midwives in qualification fluent in speaking, writing and reading Amharic language were recruited purposefully from their respective facilities to maintain the quality of the data. also Three supervisors were recruited for the same purpose.

Data collection procedure: Data was collected through face-to-face interview, measurements and reviewing of medical records of the mother using pretested structured questionnaire by trained data collectors. Data were collected day and night in order not to miss the cases. Blood pressure reading was taken while the woman was seated in the upright position and supine position using a mercury sphygmomanometer apparatus, and for referred women, BP and protein urea at time of diagnosis were taken from referral form.

Data processing and analysis: EPI data statistical software version 3.1 and Statistical Package for Social Sciences (SPSS) software version 21.0 were used for data entry and analysis. After organizing and cleaning the data,

frequencies and percentages were calculated to all variables that were related to the objectives of the study. Variables with p-value less than 0.25 in binary logistic regression analysis were entered into the multivariable logistic regression analysis to control confounders. Odds ratio with 95% confidence interval was used to examine associations between dependent and independent variables. P-value less than 0.05 was considered significant. Finally, the result was presented by using tables and narrative forms.

Data quality control measures: The quality of the data was assured by using validated and pre-tested questionnaire. Prior to the actual data collection, pre-testing was done on 5% of the total study subjects at Chena Hospital which was not included in the actual study, and based on the findings necessary amendments were made. Reliability of the questions used to measure psychological stress of mothers was tested by Cronbach's alpha test (0.89). Data collectors were trained for one day intensively on the study instrument and data collection procedure that included the relevance of the study, the objective of the study, confidentiality of the information, informed consent and interview technique. The data collectors worked under close supervision of the supervisors to ensure adherence to correct data collection procedures. The supervisors reviewed the filled questionnaires at the end of data collection every day for completeness.

Every morning, the supervisors and the data collectors conducted a morning session to solve problem, if encountered, as early as possible and to take corrective measures accordingly. Moreover, the data was carefully entered and cleaned before the analysis.

Ethical considerations: The study did not involve any experiment, and no harm was expected on human subjects, exception of benefit. Ethical clearance from Mizan Tepi University and permission from respective authorities and written consent of respondents' were obtained before the data collection. To get full co-operation, respondents were reassured about the confidentiality of their responses. They were also informed their voluntarily participation and right to take part or terminate at any time they wanted.

Since the subjects of the study could raise ethical issues, care was taken in the design of the questionnaire.

RESULTS

Socio-demographic characteristics: Among the total study participants, 155(37.3%) were aged between 20-24 years, more than half 236(56.7%) of the respondents were orthodox in religion, and 403(96.9%) were married. Almost half of the participants were from rural areas, 214(51.4%). Regarding their educational level, 150(36.1%) of the respondents attended primary school, the majority 276(66.3%) were housewives, and 230(55.3) of the family sizes of the participants were between 3-4 (Table 1).

Prevalence of pregnancy induced hypertension:

The prevalence of pregnancy induced hypertension among women attending delivery service in the three hospitals of this study was 33(7.9%). The mean of systolic blood pressure was 110.72 ± 15.315 with range of 90 mmHg to 210 mmHg, and the mean of diastolic blood pressure was 72.71 ± 13.093 with range of 50 mmHg to 160 mmHg. The result of proteinuria ranged from negative to 3+ in dipstick test. Out of the total of women who had pregnancy induced hypertension, 5(15.2%) were gestational hypertension, 12(36.4%) were mild preeclampsia, 15(45.5%) were severe preeclampsia and 1(3%) were eclampsia.

Table 1: Distribution of the study participants by their socio- demographic characteristics at MTUTH, Tepi and Gebretsadikshawo hospitals, south west Ethiopia, Nov, 2016.

Variables	Frequency(n=416)	percent	
Age of women	<20	54	13.0
	20-24	155	37.3
	25-29	131	31.5
	30-34	45	10.8
	≥35	31	7.5
Address of women	Rural	214	51.4
	Urban	202	48.6
Religion	Muslim	57	13.7
	Orthodox	236	56.7
	Protestant	118	28.4
	Catholic	1	0.2
	Other*	4	1.0
Marital status	Married	403	96.9
	Single	10	2.4
	Divorced	2	0.5
	Widowed	1	0.2
Educational status	Illiterate	104	25.0
	Primary	151	36.3
	Secondary school	78	18.8
	Preparatory school	26	6.2
	Diploma	47	11.3
	Degree and above	10	2.4
Occupational status	Housewife	277	66.6
	Governmental	69	16.6
	NGO	53	12.7
	Self	17	4.1
Family size	1-2	83	20.0
	3-4	230	55.3
	≥5	103	24.8

*Other –neutral

Variables related to obstetric conditions: Out of the pregnant women who participated in study, 408(98.1%) of the pregnancy were wanted, and 224(53.8%) of pregnancy were multigravida. Regarding parity of the women, 261(62.7%) had parity of 1-4, and the majority, 309(74.3%) of

gestational ages were between 37 and 42 weeks. Only 5(1.3%) of the pregnant mothers who were admitted for delivery had previous history of PIH, only 3(0.8) of them had history of gestational diabetic mellitus while 20(4.8%) of the pregnancies were multiple ones (Table 2).

Table 2: Frequency distribution of variables related to obstetric conditions among women attending delivery service at MTUTH, Tepi and Gebretsadikshawo hospitals, southwest Ethiopia, 2016

Variables		Frequency (n=416)	percentage
Pregnancy status	Wanted	408	98.1
	Unwanted	8	1.9
Gravida	Primigravida	192	46.2
	Multigravida	224	53.8
Parity	0	131	31.5
	1-4	261	62.7
	≥5	24	5.8
Gestational age	<37	106	25.5
	37-42	309	74.3
	>42	1	0.2
History of previous PIH(n=385)	Had	5	1.3
	Not had	380	98.7
Multiple pregnancy	Yes	20	4.8
	No	373	89.7
History of previous GDM(n=386)	yes	3	0.8
	No	383	99.2

NB: GDM=Gestational Diabetic Mellitus

Medical and family history related variables: Regarding medical and family histories of illness, out of the total, 43(10.3%) had family history of chronic hypertension, 16(3.8%) of them had family history of pregnancy induced hypertension commonly from their mothers, 11(84.6). Regarding kidney diseases, 32(7.7%) of the

respondents had history of kidney diseases during the current pregnancy, and only 7(1.7%) of them had history of chronic diabetic mellitus. From the study participants, only 36(8.7%) of them had family history of diabetic mellitus and 2 (0.5%) of them had history of asthma (Table 3).

Table 3: Distributions of medical and family history risk factors among delivered women at MTUTH, Tepi and Gebretsadikshawo hospitals, South west Ethiopia, 2016

Variables		Frequency =416	Percent
Family history of chronic hypertension	Had	43	10.3
	Not had	373	89.7
Family history of PIH	Had	16	3.8
	Not had	402	96.6
History of diabetic mellitus(DM)	Had	7	1.7
	Not had	409	98.3
Family history of DM	Had	36	8.7
	Not had	380	91.3
History of kidney diseases	Had	32	7.7
	Not had	389	93.5
Currently history of asthma.	Had	2	0.5
	Not had	414	94.0

Variables related to personal risks: Among the respondents, 9(2.2%) had history of smoking cigarette, of which 2(0.5%) were current smokers while 23(5.5%) of the family members smoked cigarette, mostly the husbands, 20 (87%). From the total of the mothers attending delivery service, 350(84.1%) had mid upper arm circumference ≥ 21 cm whereas 66(15.9%) them were < 21 cm.

Regarding sleeping pattern of women during current pregnancy, more than half, 250(60.1%), of them sleep ≥ 9 hours per night, and 164(39.4%) of women were doing scheduled regular physical exercise during their current pregnancy. Based on the nine items used to assess psychological stress, 171(41.1%) of the women had psychological stress during current pregnancy (Table 4).

Table 4: Distribution of the study subjects by their personal risk factors among women attending delivery service at MTUTH, Tepi and Gebretsadikshawo hospitals, Southwest Ethiopia, Nov, 2016.

Variables		Frequency	Percent
Any cigarettes smoking	No	407	97.8
	Yes	9	2.2
Status of smoking	Current smoker	2	0.5
	Former smoker	7	1.7
Any family members who smoke cigarette	Yes	23	5.5
	No	393	94.5
Whom family members smoke cigarette(n=23)	Husband	20	87.0
	Other*	3	13.0
Psychological stress during current pregnancy (n=416)	Not stressed	245	58.9
	Stressed	171	41.1
Mid upper arm circumference in centimeter (n=416)	< 21 cm	66	15.9
	≥ 21 cm	350	84.1
Sleep pattern in hours per night(n=416)	≤ 6	13	3.1
	7-8	153	36.8
	≥ 9	250	60.1
Mothers took nap per day (n=416)	Yes	233	56.0
	No	183	44.0
Perform scheduled physical exercise during current pregnancy (n=416)	Yes	164	39.4
	No	252	60.6

*Children, Relatives, Any other person live with family members

Variables related to health facility utilization: According to this study, 406(97.6%) of the pregnant mothers utilized health facility for ANC follow-up, of which 8(2%) attended first visit of their routine ANC follow-up and 398 (98%) attended ANC more than twice. Regarding utilization of health facilities for health problems other than the current pregnancy, only 132(31.7%) utilized health facilities for gynecology, surgical and medical problems.

Predictors of pregnancy induced hypertension: In the multivariable logistic regression analysis, factors contributing to pregnancy induced hypertension were identified: Positive family history of pregnancy induced hypertension, kidney diseases during pregnancy, asthma and gestational age had statistically significant associations with pregnancy induced hypertension (Table 5).

The pregnant women attending delivery service with family history of pregnancy induced hypertension were five times more likely to develop pregnancy

induced hypertension than those who did not have family history of pregnancy induced hypertension (AOR=5.25 at 95%CI= (1.39-19.86).

As this study showed, having kidney diseases during pregnancy was 3.25 times more likely to develop pregnancy induced hypertension as compared to pregnant mothers who did not have kidney diseases during pregnancy (AOR=3.32 at 95%CI= (1.04-10.58). Women who had asthma more likely develop pregnancy induced hypertension by 38 times as compared with women those attending delivery service did not have asthma (at 95% CI, AOR=37.95(1.41-1021).

In this study, gestational was age identified as predictor, indicating that women with gestational age greater than or equal to 37 weeks were less likely to develop pregnancy induced hypertension by 9.6% as compared to women gestational age less than 37weeks (AOR=0.096 at 95% CI(0.04-0.23) (Table 5).

Table 5: Multivariable logistic regression analysis of pregnancy induced hypertension and associated factors among women attending delivery service at MTUTH, Tepi and Gebretsadikshawo hospital, Southwestern 11 Ethiopia, 2016.

Variables		COR (95% CI)	AOR(95%CI)
Family size	1-2	1.00	1.00
	3-4	1.82(0.67-4.93)	1.44(0.47-4.40)
	≥5	0.71(0.22-2.85)	0.59(0.13-2.67)
Gestational age	<37	1.00	1.00
	≥37	0.12(0.06-.26)	0.096(0.04-0.23)**
Gravida	Primigravida	1.53(0.76-3.10)	1.17(0.48-2.86)
	Multigravida	1.00	1.00
Family history of PIH	Yes	6.04(1.96-18.60)	5.25(1.39-19.86)*
	No	1.000	1.00
Kidney diseases	Yes	3.05(-1.16-8.05)	3.32(1.04-10.58)*
	No	1.00	1.00
Asthma	Yes	11.94(0.729-195.36)	37.95(1.41-1021)*
	No	1.00	1.00
MUAC measurement	<21 cm	1.00	1.00
	≥21cm	0.558 (0.24-1.30)	0.51(0.19-1.35)

*Statistically Significant (P<0.05),

**high statistically significant (p<0.01)

DISCUSSION

The prevalence of pregnancy induced hypertension among women attending delivery service in this study was 33(7.9%). This might increase the morbidity and mortality of the mother and the fetus. If appropriate preventive measures are not taken for the risk of pregnant women, in long term, it might be the first cause of maternal mortality. The prevalence of PIH in

this study is similar with the study conducted in India which was 7.8 % (18). However, it is slightly lower than the findings of studies done in Iran 9.8% (19), in Jimma University Specialized Hospital (8.48%) and Dessie Referral Hospital, 8.4%(20,21).

This difference might be attributed to differences in the study period and study design. The population might also be different in lifestyle and culture. However, the

prevalence in this study is still greater than the study done in Ethiopia at Tikur Anbessa Hospital which was 5.3% and Mettu Karl Hospital, 2.4% (7, 22).

This discrepancy might be because of differences in the study period, study design and health seeking behaviors of pregnant women. In addition, the gap might be due to current health policy which focuses on implementation of focused ANC and exempted service for maternal care which increases the health care seeking behavior of pregnant women and delivery at health facility which increases detection of the case.

In this study, some associated factors of pregnancy induced hypertension were also identified. Having family history of pregnancy induced hypertension had about five times greater odds of developing pregnancy induced hypertension. This is consistent with the study conducted in Ghana (23) and in the textbook of current diagnosis and treatment in obstetrics and gynecology (2). This might have occurred due to genetic factors that contribute to the physiologic predisposition of pregnancy induced hypertension.

This study revealed that having kidney diseases during pregnancy increases the likelihood of pregnancy induced hypertension. This finding was similar with the study conducted in Public Health facility of Dirashe Woreda which showed that preexisting renal diseases had statistically significant associations with pregnancy induced hypertension (24). Other theories also support that renal physiological function had direct relationship with cardiovascular system (2).

This study also showed that women who had asthma are at more risk to develop pregnancy induced hypertension than those who did not have asthma. This is in line with the study conducted in New York and Canada (25,26). The other variable associated with PIH in this study was gestational age, which showed that women with gestational age greater than or equal to 37 weeks were less likely to develop pregnancy induced hypertension than women with gestational age less than 37 weeks. However this is inconsistent with the literature. This might be due to the fact that the population of this study was women attending delivery service so that more women with PIH might be delivered before and around 37 weeks of gestational age to reduce the risk of maternal and fetal complication.

As any other cross-sectional study, this study has strength and weakness. The possible limitations may arise from women's readiness and ability to provide every information about themselves and their family correctly based on which PIH was related and; recall and social desirability bias may be introduced during

data collection from the pregnant women as they were self-referred. However, measure has been taken to minimize these limitations by using targeted questions.

The other limitation of this study was few variables have small observation which causes lower precision, so it was carefully interpreted. Inclusion of all hospitals from the three zones was strength of this study.

The prevalence of pregnancy induced hypertension among women attending delivery service was 7.9% which indicates that a significant number of women attending delivery services at Mizan Tepi Teaching Hospital, Gebretsadikshawo and Tepi Hospital developed pregnancy induced hypertension. Among pregnancy induced hypertensions, severe preeclampsia was the most common. Having family history of pregnancy induced hypertension, chronic renal diseases (kidney diseases) and gestational age were the factors associated with pregnancy induced hypertension.

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