

Identification of Risk Factors Associated with Preeclampsia in a Selected Hospital of Lalitpur, Nepal: A Case-Control Study

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ABSTRACT

Pre-eclampsia is a multisystemic disorder associated with pregnancy, the clinical symptoms of this condition are hypertension, proteinuria, oedema and platelet aggregation; the symptoms includes vasoconstriction which caused maternal hypertension, impairment of placenta-vascular endothelial integrity reduced uterine blood flow with increased permeability and activation of the coagulation factors. Objective of the study is to identify the risk factors for pre-eclampsia among clients with pre-eclampsia and find out the differences between cases and control.

An observational case control design was used for collecting data. Face to face, interview was conducted among purposively selected 168 respondents (56 cases and 112 controls) Data was entered and analyzed through SPSS 16 version for descriptive as well as inferential analysis. All ethical aspects were followed.

In bivariate analysis age, gravida, twin type of residence, type of food intake, type of family, Birth interval, blood group, maternal Rh factor, newborn sex, maternal BMI and History of abortion were not significantly associated with development of PE. High blood pressure, gestational diabetes, pre-eclampsia, eclampsia which was developed in previous pregnancy were not associated with development of PE in current pregnancy too. Regarding family history, hypertension (2.48 times) and heart disease (2.14times) were significantly associate with development of pre-eclampsia. Use of contraception, calcium intake during pregnancy and alcohol use during pregnancy also were not associated with development of PE

In conclusion, family history of hypertension and heart disease are the major risk factors for the development of preeclampsia. For the prevention of the complications of preeclampsia, the health care providers should provide the suggestions on routine antenatal checkup to pregnant women

Key words: Lalitpur, Preeclampsia, Risk factors, Women.

INTRODUCTION

Maternal morbidity and mortality related to preventable causes contribute to a higher number of the world's burden of disease. It is

also the great issue in the United States of America .¹

Preeclampsia is defined by hypertension and proteinuria, with or without pathologic edema that occurs after 20-weeks' of

gestation, it also can present up to 4-6 weeks post-partum. Worldwide, incidence of preeclampsia is 5-14 percent of all pregnancies, severe preeclampsia can develop to about 25 percent of all cases of preeclampsia² Pre-eclampsia is a leading cause of maternal and perinatal mortality and morbidity. It is condition which is associated with gravid uterus in which development of hypertension and proteinuria, sometimes progressing into a multi-organ failure with various types of clinical features.³

A study conducted in Ethiopia revealed that those women having a MUAC value ≥ 25.6 cm were two times more likely to develop preeclampsia. The findings in this study also revealed that taking fruit or vegetables during pregnancy was found to be protective for this condition. Folate intake during pregnancy has shown a significant component on the prevention of preeclampsia⁴

A study conducted in various countries revealed that Hemorrhage was the principal cause of death (33.9%) in Africa and Asia and hypertensive disorders were responsible for the most deaths (25.7%) in Latin America and the Caribbean.⁵ A systematic review showed that 10% to 15% of direct maternal deaths are related with preeclampsia and eclampsia. High maternal mortality is associated with eclampsia, rather than preeclampsia but Perinatal mortality is high due to preeclampsia. In developing countries, most of the hospitals have limited access to neonatal intensive care unit so the mortality and morbidity is considerably higher than in well-equipped settings.⁶

Developing preeclampsia in one pregnancy is poor factor of subsequent pregnancy but strong factor for recurrence in future pregnancy.⁷ a study conducted in Ethiopia showed that primigravida, twin pregnancy, history of pre-eclampsia and drinking alcohol during pregnancy were the risk factors for the development of pre-eclampsia/eclampsia.⁸ A study done in India suggest that some factors that were found to be significant predictors of risk for development of pre-eclampsia were family history of preeclampsia, higher body mass

index, employment status, less protein intake, mild physical activities. Past history of hypertension and diabetes mellitus were also contributed to develop pre eclampsia⁹.

MATERIALS & METHODS

Design

Quantitative Analytical Study, the study was institution based matched case control study using primary data.

Research Setting

The study was conducted in postnatal ward of Patan Hospital. It is the tertiary level hospital in country, providing tertiary level health service to the Nepalese people of 77 districts. It is located in the Lagankhel, Lalitpur district. The hospital is one of the referral hospitals of Nepal.

Research population

The clients, who were available at the time of data collection with any age, cast, religion and occupation, who were willing to participate in the study with the diagnosis of mild and severe preeclampsia.

Selection of cases and controls

Case group: Woman admitted to post-natal ward who delivered during preceding 2 days, who in the antenatal period or before going to labor was diagnosed by a doctor as having mild preeclampsia or severe preeclampsia.

Mild Preeclampsia

Two reading of diastolic blood pressure 90-110 mm Hg 4 hours apart after 20 weeks of gestation and proteinuria up to 2+.

Severe Preeclampsia

Diastolic blood pressure 110 mm Hg or more, systolic >160 mm Hg after 20 weeks of gestation, proteinuria³⁺ or more

Inclusion criteria for Case

The women who were clinically diagnosed with pre-eclampsia.

Well conscious, co-operative, and well oriented with time, place and person, to avoid bias from respondent's answers.

Those who were willing to participate in the study.

Exclusion criteria for cases

Those who were admitted in critical care unit.

Those had psychiatric disorder.

Control Group: Women admitted to post-natal ward who delivered during preceding 2 days and did not had Preeclampsia during pregnancy.

Inclusion criteria for Control

Women who were willing to participate in the study.

Well conscious, co-operative, and well oriented with time, place and person, to avoid bias from respondent's answers.

Matching

For each case, age and para matched control was selected; age matching was done with the liability of ± 2 years of age.

Sampling

Women were selected purposively. Study Population were identified by reviewing the women chart after getting permission of concerned authority and duty staff.

Sample size: Total sample size of the study was 56 cases and 112 controls.

The case control ratio was 1:2.

Instrumentation

Questionnaires were self-developed on the basis of research objectives, literature review, and advice through research expert and colleagues. Instrument has two parts:

Part I: Questionnaire related to socio demographic information

Part II: Questionnaire related to risk factors of preeclampsia

Validity: The content validity of the instrument in terms of the adequacy and the appropriateness of the content was established by seeking the expert opinions of concerned areas and by the review of the related literature. Opinion from the language expert was obtained for comprehensibility and simplicity of language during translation.

Reliability: To ensure reliability: The instrument was tested in 10% sample size in similar to the study setting.

Data Collection Procedure

The data was collected after obtaining the approval of research proposal from Institutional Review committee of Patan Academy of Health Science. Formal permission was taken from the concerned authorities through written request letter.

On the data collection day, respondent was given the introduction about the researcher as well as explanation about the study, its purpose and reason for choosing them as respondents and verbal consent was taken from the respondents before collecting data. Confidentiality of the obtained information was maintained. Data was collected using semi structured interview schedule.

STATISTICAL ANALYSIS

The collected data was checked and organized for completeness and accuracy and data coded, entered in to computer package with software: SPSS (Statistical Package for Social Science) version 20. Bivariate associations between the risk factors and preeclampsia under study was assessed by calculating p value and expressed as odds ratios with 95% confidence intervals. To assess the strength of association, the odds ratio was calculated.

Table 1 Socio Demographic information of the Respondents

Characteristic	Type of Study Group				Total		Odd ratio	95% CI	p-value
	Case		Control						
	No	%	No	%	No	%			
Age (in completed years)									
<20	11	34.4	21	65.6	32	19	0.940	0.518	0.840
20-35	38	32.2	80	67.8	118	70.2		1.706	
>35	7	38.9	11	61.1	18	10.7			
Gravida									
Primipara	34	33.3	68	66.7	102	60.7	1.00	0.519-1.929	1.00
Multipara	22	33.3	44	66.7	66	39.3			
Types of Residence									
Rural municipality	23	35.9	41	64.1	64	38.1	0.829	0.430-1.598	0.575
Urban municipality	33	31.7	71	68.3	104	61.9			
Type of food intake									
Vegetarian	8	34.8	15	65.2	23	13.7	0.928	0.368	0.874
Non vegetarian	48	33.1	97	66.9	145	86.3		2.340	
Type of family									
Nuclear	17	32.1	36	67.9	53	31.5	0.920	0.460	0.814
Joint	39	33.9	76	66.1	115	68.5		1.842	

Table 1 shows that total 168 respondent were involved (56 pre-eclamptic and 112 normotensive). Majority of the respondent were from age group of 20-35 years. With regard their gravida 34(33.3%) of the cases and 68 (66.7%) of the controls were prim gravida, and 22 (33.3%) cases and 44 (66.7%) controls were multigravida. Regarding type of residence, 23 (35.9%) cases and 41(64.1%) control were residing in rural municipality and 33(31.7%) cases and 71(68.3%) control were residing in urban municipality. Likewise 8(34.8%) cases and 15(65.2%) control vegetarian and 48(33.1%)

cases and 97(66.9%) control were non vegetarian. 17(32.1%) of cases and 36(67.9%) control were living in nuclear family and 39(33.9%) cases and 76 (66.1%) control were living in joint family.

In bivariate analysis age, gravida, type of residence, type of food intake and type of family were not significantly associated with development of pre-eclampsia

Table 2 depicts that Birth interval, blood group, Rh factor of women and sex of the newborn and BMI of women were not associated with development of pre-eclampsia.

Table 2 obstetrical factors

Characteristic	Type of Study Group				Total		Odd ratio	95% CI	p-value
	Case		Control						
	No	%	No	%	No	%			
Birth interval (n=66)									
<2 years	0	0	3	6.8	3	4.5	0.756	0.306-1.869	0.545
2-8 years	12	54.5	22	50	34	51.5			
>8 years	10	45.5	19	43.2	29	43.9			
Blood group									
A	15	26.8	37	33	52	31	0.842	0.630-1.124	0.242
B	9	16.1	25	22.3	34	20.2			
AB	20	35.7	29	25.9	49	29.2			
O	12	21.4	21	18.8	33	19.6			
Rh factor									
Positive	48	85.7	92	82.1	140	83.3	1.304	0.535-3.180	0.559
Negative	8	14.3	20	17.9	28	16.7			
BMI									
Under weight (<18.5)	-	-	-	-	-	-			
Normal (18.5–24.9)	19	33.9	37	33	56	33.3	0.926	0.607-1.412	0.719
Overweight (25.0–29.9)	21	37.5	49	43.8	70	41.7			
Obesity (≥30.0)	16	28.6	26	23.2	42	25			
ANC visit									
Yes	56	100	112	100	1681	100			
No	-	-	-	-	-	-			

Table 3 History of previous pregnancy

Demographic Characteristic	Type of Study Group				Total		Odd ratio	95% CI	p-value
	Case		Control						
	N	%	N	%	N	%			
High Blood Pressure							0.305	0.078-	0.089
Yes	19	86.4%	29	65.9%	48	72.7%		1.199	
No	3	13.6%	15	34.1%	18	27.3%			
Gestational diabetes									
Yes	3	13.6%	5	11.4%	8	12.1%	1.232	0.266-	0.790
No	19	86.4%	39	88.6%	58	87.9%		5.704	
Pre eclampsia									
Yes	13	59.1%	21	47.7	34	51.5	1.582	0.562-	0.385
No	9	40.9	23	52.3	32	48.5		4.456	
Eclampsia									
Yes	1	4.5%	2	4.5%	3	4.5	1	0.086-	1
No	21	95.5%	42	95.5%	63	95.5		11.669	
Heart Disease									
Yes	0	0.00	0	0.00%	0	0.00			
No	22	100%	44	100%	66	100			
Kidney Disease									
Yes	0	0.00	0	0.00	0	0.00			
No	22	100%	44	100%	66	100%			
Rheumatoid Arthritis									
Yes	0	0.00	1	2.3%	1	1.5%	2.792-	0.000	1.000
No	22	100%	43	97.7%	65	98.5%	0.251		

Table 3 revealed that High blood pressure, pregnancy were not associated with gestational diabetes, pre-eclampsia, development of PE in current pregnancy. eclampsia that was developed in previous

Table 4 Family history of preeclamptic cases and control

Demographic Characteristic	Type of Study Group				Total		Odd ratio	95% CI	p-value
	Case		Control						
	No	%	No	%	No	%			
Family history pre-eclampsia									
Yes	16	28.6%	26	23.2%	42	25%	1.323	0.640-	0.450
No	40	71.4	86	76.8%	126	75%		2.737	
Family history eclampsia									
Yes	10	17.9%	10	8.9%	20	11.9%	2.217	0.863	0.098
No	46	82.1%	102	91.1%	148	88.1%		5.694	
Family history hypertension									
Yes	43	76.8%	64	57.1%	107	63.7%	2.481	1.202	0.014
No	13	23.2%	48	42.9%	61	36.3%		5.120	
Family history heart disease									
Yes	31	55.4%	41	36.6%	72	42.9%	2.147	1.119	0.022
No	25	44.6%	71	63.4%	96	57.1%		4.122	
Family history of diabetes mellitus									
Yes	33	58.9%	49	43.8%	82	48.8%	1.845	0.963	0.65
No	23	41.1%	63	56.2%	86	51.2%		3.534	
Family history Kidney Disease									
Yes	1	1.8%	2	1.8%	3	1.8%	1.000	0.089-	1.000
No	55	98.2%	110	98.2%	165	98.2%		11.270	

Table 4 represents that the family history of pre-eclamptic cases, family history of pre-eclampsia, eclampsia and diabetes mellitus were not associated with development of PE in current pregnancy but family history of hypertension (2.48 times) and heart disease (2.14times) were significantly associate with development of pre-eclampsia

Table 5 Behavioral factors of preeclamptic cases and controls

Demographic Characteristic	Type of Study Group				Total		Odd ratio	95% CI	p-value
	Case		Control						
	No	%	No	%	No	%			
Use of contraception									
Yes	24	42.9%	47	42%	71	42.3%	1.037	0.542-	0.912
No	32	57.1%	65	58%	97	57.7%		1.984	
Calcium intake during pregnancy									
Yes	44	78.6%	91	81.2%	135	80.4%	0.846	0.382	0.681
No	12	21.4%	21	18.8%	33	19.6%		1.874	
Alcohol use during pregnancy									
Yes	16	28.6%	25	22.3%	41	24.4%	1.392	0.670	0.375
No	40	71.4%	87	77.7%	127	75.6%		2.891	
Cigrate smoking during pregnancy									
Yes	0	0.00%	0	0.00%	0	0.00%			
No	56	100%	112	100%	168	100%			

In this study regarding the behavioral factors of cases use of contraception, calcium intake during pregnancy and alcohol use during pregnancy were not associated with development of PE.

DISCUSSION

This chapter deals with the discussion followed by conclusion, limitations implication and recommendations based on the findings of the study. The discussion presents major findings of the study in comparison with those of other studies identified from literature review.

The findings of present study reveals that age (OR=0.940, CI=0.518-1.706, p value=0.840) and type of family (OR=0.920, CI= 0.460-1.842 p value= 0.814) were not significantly associated with development of Pre-eclampsia (PE), this finding is supported with the findings of study conducted in India in which age (OR-2.28, p value-0.10) and type of family (OR-1.63 and P Value- 0.06) is not associated with development of PE too.¹⁰

The study conducted in Ethiopia revealed that the odds of developing preeclampsia were 4-times higher among mothers aged ≥ 35 years compared to mothers in the age group 20–34 years (AOR=4.01; 95% CI=1.25–12.80), that result is contrast with the result of this study.¹¹ Types of residence (OR=0.829, CI=0.430-1.598, p value=0.575) is not responsible to develop pre-eclampsia, this result is contradictory to the result of the study conducted in Ethiopia in which, it was more than 3-times higher among mothers living in rural residents compared to those residing in urban areas (AOR=3.30; 95% CI=1.50–7.26)¹⁰. Gravida (OR=1, CI=0.519-1.929, p value=1.00) is not significantly associated with development of PE this finding is consistent with the finding of the study conducted in India (gravida, OR=1, CI=0.519-1.929, p value=1)¹⁰. Type of food intake (OR=0.928, CI= 0.368-2.340, p value= 0.874) is not significantly associated but a study conducted in India revealed that Intake of Non veg. diet

($p=0.042$) is risk factors with development of PE¹².

In this study, BMI is not significantly associated; this result is contrast with study conducted in India, which showed BMI ($P < 0.001$) is significantly associated with development of PE¹⁰. History of abortion is not significantly associated; this result is supported by the study conducted in india.¹⁰

In thus study High blood pressure (OR=0.305, CI=0.078-1.199, p value=0.089), gestational diabetes (OR=1.232, CI=0.266-5.704, p value=0.790), pre-eclampsia (OR=1.582, CI=0.562-4.456, p value=0.385), eclampsia (OR=1, CI=0.086-11.669, p value=1) which was developed in previous pregnancy were not associated with development of PE in current pregnancy. The study conducted in northern Ethiopia showed that history of preeclampsia on previous pregnancy was strongly associated with development of pre-eclampsia. The odds of developing preeclampsia were 5.55 times higher for women with a history of preeclampsia comparing to women who had no history of preeclampsia (AOR: 5.55 at 95% CI: 1.80, 17.10) which result is contradict with the result of present study.¹²

Regarding the family history, family history of pre-eclampsia (OR=1.323, CI=0.640-2.737, p value=0.450), eclampsia (OR=2.217, CI=0.863-5.694, p value=0.098), and diabetes mellitus (OR=1.845, CI=0.963 p value=), were not associated with development of PE in current pregnancy. This result is contrast with various study result, a study conducted in Northern Ethiopia revealed that the pregnant women who had a family history of preeclampsia were 5.24 times more likely to develop preeclampsia than those who had no family history of preeclampsia (AOR: 5.24 at 95% CI: 1.85, 14.80).¹²

Regarding family history, hypertension had 2.48 times higher risk (OR=2.481, CI=1.202-5.120, p value=0.014) of development of preeclampsia, this result is consistent with the study conducted in northern ethiopia in which family history of hypertension had 2.60 times higher risk of development

preeclampsia (AOR: 2.60 at 95% CI: 1.15, 5.92). This finding is also consistent with other studies conducted in Ethiopia, Uganda, and South India.¹²

In this study regarding the behavioral factors of cases use of contraception (OR=, CI=, p value=), calcium intake during pregnancy and alcohol use during pregnancy were not associated with development of PE

CONCLUSION

This study concluded that family history of hypertension and heart disease are the major risk factors for development of pre-eclampsia. All the risk factors is to be asked routinely in antenatal checkup to pregnant women to prevent the development of PE.

Limitations of the study

The sample size used in the study was very small limiting the generalizability of the findings.

Statistically significant was only made by bivariate analysis whereas multivariate logistic regression analysis was not used to identify a combination of risk factors associated with odds of pre-eclampsia

Recommendations

Similar type of study could be done with larger sample.

Future research should explore the other factors affecting development of preeclampsia, identification of these factors could be used to increase the effectiveness of therapeutic interventions.

Declaration by Authors

Ethical Approval: Approved by Institutional Review Committee of Patan Academy of Health Sciences

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