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RISK FACTORS FOR SEVERE PRE - ECLAMPSIA AND ECLAMPSIA IN MULAGO HOSPITAL, KAMPALA, UGANDA

J. WANDABWA, P. DOYLE, P. KIONDO, O. CAMPBELL, N. MACONICHIE and G. WELISHE

ABSTRACT

***Objective*: To determine the risk factors for severe pre-eclampsia and eclampsia in Mulago Hospital, Kampala, Uganda.**
***Design*: A case control study.**
***Setting*: Mulago Hospital labour ward**
***Subject:* One hundread and fourty three women with severe pre-eclampsia/ eclampsia and 500 women with normal delivery.**
***Results*: The predictors of severe pre-eclampsia/eclampsia were: low socio - economic status (OR 7.6, 95% CI 3.9 - 26.9), chronic hypertension (OR 26.9,95% CI 4.3-170.4), family history of hypertension (OR 1.9, 95% CI 1.2-2.9), nulliparity (OR 2.2, 95% CI 1.2-4.3) and delivery of male babies (OR 1.5, 95% CI 1.0 to 2.3).**
***Conclusion:* Severe pre - eclampsia is one of the main causes of maternal morbidity and mortality in Mulago hospital. The predictors of severe pre - eclampsia were chronic hypertension, family history of hypertension, low socio - economic status, nulliparity and delivering male babies. Health workers need to identify women at risk and offer them counseling and, those who develop pre - eclampsia be referred and managed in hospitals with expertise and facilities. Those who develop severe pre-eclampsia should be delivered immediately so as to reduce the morbidity and mortality associated with this condition.**

INTRODUCTION

Pre - eclampsia affects 2-10% of pregnant women worldwide and eclampsia 0.03-0.05% (1). The reported incidences of eclampsia in developing countries are between 0.1 to 0.2 per 100 deliveries (2) while in the Western world is 1 in 2000 to 1 in 3000 (3).

It is estimated that world wide 13% of maternal mortality is due to hypertensive disorders of pregnancy (4) but it is much higher in developing countries where the estimates are between 20-80% in Africa and Latin America (5,6,7,8).

The mechanisms responsible for development of the syndrome of pre - eclampsia as well as early risk assessment are still a major challenge.

The cause of pre - eclampsia is thought to be due to abnormal placentation and the presence of the placenta is necessary for pre - eclampsia to occur. (9). Other factors that are thought to contribute to the causes of pre - eclampsia are genetic, environmental and behavior which can interact with reduced perfusion of placenta leading to pre eclampsia (7). The disease commonly affects primigravidae / nulliparous women, women with pre - existing hypertension, diabetes mellitus or those with thrombophillic like anticardiolipin antibody 11 - 13 In addition obstetric condition which increase placenta size such as multiple pregnancy and hyditiform moles predispose to pre - eclampsia by relative decrease of placental blood flow (10, 14). Other risk factors that have been reported are age of more than 34 years, obese women, pregnancy body mass index of more than 24.2kg / m^2 and urinary tract infection (6, 12,13,15). Some studies have reported age below 19 years as a risk factor for pre - eclampsia but this may be confounded by nulliparity 6,8.

Medical condition such as renal disease, chronic hypertension or high blood pressure at booking and chronic autoimmune disease are risk factors for pre - eclampsia. Other factors are thrombophilias and insulin resistance (10). Change of paternity in multiparous women has been associated with pre - eclampsia and eclampsia (16,17).

In Mexico low socio - economic status of women doubled the risk of pre eclampsia and eclampsia (18). A study in Australia found working women compared to non working ones had a higher risk of developing pre - eclampsia and eclampsia (19). This may be related to the stress that women get during work. Black ethnicity has been reported as risk factor for pre eclampsia in USA and UK (20).

In Mulago Hospital labour ward, about 3 to 4 women with pre-eclampsia are admitted daily and this constitutes 8.2% of the admissions and, severe pre - eclampsia/eclampsia contributes 17.6% of near misses and 21% of maternal mortality 21. The incidence of pre eclampsia/eclampsia in Uganda is high and is associated with high maternal morbidity and mortality. The objective of this study therefore was to determine the risk factors for severe pre - eclampsia and eclampsia so as to screen women at risk and reduce the maternal morbidity and mortality associated with this condition.

MATERIALS AND METHODS

Study design: This was part of a case control study for risk factors for severe maternal morbidity conducted in Mulago Hospital, Uganda between 15th November 2001 and 30thNovember 2002 (22). The risk factors of severe pre-eclampsia/eclampsia were studied.

Setting: Mulago Hospital labour suite where mothers with complications in pregnancy are referred for delivery. Mulago Hospital is a National Referral Hospital for Uganda and Teaching Hospital for Makerere University College of Health Sciences. It is also a District Hospital for Kampala City Council. Most women who develop complications in and around Kampala City are referred here for management.

Study population: Women who were admitted in Mulago Hospital labour suite.

Selection of cases: Both the cases and the controls lived 15 kilometers or less from Mulago Hospital and consented to the study. In this study severe pre - eclampsia was defined as a woman who was 20 weeks of pregnancy or more, developed hypertension of 160/110 mmHg or more on two occasions at least four hours a part, had urine protein of 2 + or more on dipstick, and epigastric pain or right upper quadrant pain or tenderness, visual disturbances, severe headache, oliguria defined as urinary out put of less than 100 milliliters during any four hour period of admission, had pulmonary oedema and, an episode of jaundice. Eclampsia was when a woman with severe pre - eclampsia developed a convulsion or generalised fit.

Selection of the controls: Controls were women who had a normal blood pressure, had a normal vaginal delivery to a singleton live baby and had a normal blood loss. The controls were recruited using computer generated numbers, where two women were selected every day if they satisfied the inclusion criteria.
The cases and controls selected were interviewed about their socio - demographic characteristics, social and family history, gynaecological operations, blood transfusion, medical conditions, past and present obstetric performance. In the socio demographic we asked about the type houses they lived in as a measure of socio - economic status. Those women who were too sick, their spouses or first relatives were interviewed and later when the patients improved the responses were confirmed. At discharge or death the clinical record files were reviewed and information on management was extracted. All cases and controls had their blood examined for HIV using Determine test (Abbott Laboratories, Abbott Park, IL). This was an immunochromatographic test for qualitative detection of HIV -1/2. The test was performed by applying 50ul of serum to the test pad at the bottom of the strip.

Analysis: The data collected were checked, coded and double entered using Epi-Info 6.04 statistical software package. The data were cleaned and transferred to stata 8 for analysis. The exposures of interest were socio - demographic factors, medical diseases, past and present obstetric performances and laboratory investigations.

Univariate analysis: The numbers and percentages of cases and controls at each level of exposure are presented. Chi - square test was used to compare the proportions.

Logistic regression: Logistic regression was used to establish the strength of association between exposure variables and severe pre-eclampsia. Results are presented as odds ratios with the corresponding 95% confidence intervals, where an odds ratio of greater than one represents an increased risk of severe pre eclampsia in that exposure compared to base line category. Several factors that were influential in the study were put in a model. The logistic regression model first included exposure variables from socio demographic, family and social characteristics. Those that were statistically significant were included in the next model which included gynaecological and

past obstetric performance and those significant were included in final model with present obstetric performance and HIV status. Age was included in the model because it is a known risk factor. All factors that had a p - value of less than 0.1 in the socio demographics, social, family and medical history were selected together with age and put in one logistic regression model and adjusted. Then significant factors with p - value of 0.05 or less from this model were adjusted against past obstetric outcome, and then adjusted against current obstetric outcome and the laboratory results.

RESULTS

One hundred and forty three cases of severe pre eclampsia and eclampsia were recruited and were compared against the five hundred controls (normal deliveries). There were sixty five cases of eclampsia and seventy eight cases of severe pre - eclampsia.

The socio - demographic characteristics are shown in table 1. The mean age was similar in both groups (23.2 years, SD=5.3 years). A third of the women in both the cases and controls were aged below twenty years and, 4% of cases and 6% of controls were aged 35 years and above. Sixty one percent of cases lived more than five kilometers from Mulago hospital compared to 18% of the controls. The majority of women in both groups were peasants with 71% of cases and 74% of controls practicing subsistence farming as their only occupation, but 12% cases compared to 3% controls were professionals (p <0.001).

Majority controls (83%) lived in better houses of bricks, plastered with iron or tiled roofs compared to the controls (53%). Only 3% of controls lived in mud and wattle houses with or without iron roofs compared to 12% of cases (p < 0. 00 1).

Only 3% of cases and 0.4% controls had chronic hypertension and the difference between the groups was statistically significant (P<0.003).

The past and current obstetric performance of cases and controls are shown in table 2. There was a higher risk of pre - eclampsia and eclampsia among women who had abortion (OR 1.9, 95%CI 1.0-3.4) and delivered by Caesarean section (OR 13.8, 95% CI 3.8-50.3) in the previous delivery.

Forty one percent of cases and 30% controls were primigravidae and, 7% of cases and 23% of controls were grand multigravidae. The mean parity of cases was 2.6 (SD=2.0) and controls 3.0(SD=2.0) and range of 1 to 14. There was no statistical difference between the two groups (P<0.06).

Twenty seven percent of cases had a birth interval of more than 60 months between the last delivery and the present pregnancy compared with 12% of the controls (P<0.02) and, 11 % of cases compared to 3% controls never had antenatal care (P<0.001). The cases (60%) were more likely to deliver male babies compared to (50%) controls. The difference between the two groups was statistically significant (P <0.04).

The HIV sero prevalence was in 6% among the cases and 9% controls (p. >0.31). Thirty nine percent of the cases had a platelet count below 150 × 10(9) cells per liter compared to 11 % controls and the two groups had a statistical difference (P<0.001)

Adjusted odds ratio for risk factors for severe pre eclampsia and eclampsia are shown in Table 3.

Factors found to be of importance in univariate analyses (table 1 and.2) were entered into a multivariate logistic regression model. Age was included in this model so as to be consistent with other studies. Table 3 presents a summary of the adjusted odds ratios for factors found to be independently related to the outcome. The factors used for adjustment are presented as footnotes.

Table 1

Socio-demographic characteristics of severe pre - eclampsia and eclampsia (143 cases) and 500 controls

Characteristic	Stratum	Cases		Controls		Crude odd Ratio		P-value
		No.	(%)	No.	(%)	(95% CI)		
Distance from	0-5	55	(38.5)	408	(81.6)	1.0	(-)	
home to Mulago	6-10	57	(39.9)	81	(16.2)	2.5	(1.6-3.8)	0.00
(km)	11-15	31	(21.6)	11	(2.2)	6.7	(3.7-12.0)	
Age in years	14-19	49	(34.3)	155	(31.0)	1.1	(0.7-1.6)	
	20-29	78	(54.5)	262	(52.4)	1.0	(-)	
	30-35	10	(7.0)	52	(10.4)	0.7	(0.3-1.3)	0.32
	35+	6	(4.2)	31	(6.2)	0.7	(0.3-1.6)	
Marital status	Married	112	(78.3)	425	(85.0)	1.0	(-)	
	Single	31	(21.7)	75	(15.0)	1.6	(1.0-2.5)	0.05
Religion	Protestant	44	(30.8)	141	(28.2)	1.0	(-)	
	Catholic	50	(35.0)	173	(34.6)	0.9	(0.6-1.5)	0.10
	Muslim	38	(26.6)	160	(32.0)	0.8	(0.5-1.2)	
	Seven day	2	(1.4)	5	(1.0)	1.3	(0.2-6.8)	
	Saved	9	(6.3)	21	(4.2)	1.4	(0.6-3.2)	
Education level of	Primary and nil	74	(51.8)	299	(59.8)	0.9	(0.6-1.3)	
Patient	Secondary	54	(37.8)	186	(37.2)	1.0	(-)	0.00
	College	15	(10.5)	15	(3.0)	3.4	(1.3-7.1)	
Patients job	Commerce	24	(16.9)	114	(22.8)	1.3	(0.8-2.1)	
	Working women	17	(11.7)	14	(2.8)	5.7	(2.4-13.1)	
	Peasant/nil	102	(71.3)	372	(74.4)	1.0	(-)	
Spouse job	Commerce	24	(16.9)	205	(41.0)	1.0	(-)	
	Working	17	(11.7)	106	(21.2)	1.2	(0.8-1.9)	
	Peasant/nil	102	(71.3)	189	(37.8)	0.8	(0.4-1.3)	
Type of house	Brick plastered	78	(53.2)	417	(83.4)	1.0	(-)	
	Brick only	48	(33.6)	69	(13.8)	3.8	(2.4-5.9)	
	Mud only	17	(11.8)	14	(2.8)	6.5	(3.1-13.9)	
Need to Request	Yes	97	(67.8)	453	(90.6)	4.6	(2.9-7.3)	
permission to visit	No	46	(32.2)	47	(9.4)	1.0	(-)	
Health Unit/hospital								
Who pays for	Self and spouse	110	(77.5)	403	(80.6)	1.0	(-)	
treatment	Others	42	(22.5)	97	(19.4)	4.4	(2.6-7.3)	
Family hypertension	Yes	73	(52.5)	194	(38.8)	1.7	(1.6-3.3)	
	No	68	(47.5)	306	(61.2)	1.0	(-)	
Hypertension (self)	Yes	11	(7.7)	2	(0.4)	20.8	(4.5-94.8)	
	No	132	(92.3)	498	(95.6)	1.0	(-)	
Admission to hospital	Yes	20	(14.0)	31	(6.2)	2.5	(1.4-4.5)	
during antenatal	No	123	(86.0)	469	(93.8)	1.0	(-)	17

Table 2

Past and current Obstetric performance and laboratory results of severe pre - eclampsia and eclampsia (84 cases) and 350 controls

Characteristic	Stratum	Cases		Controls		Crude odd Ratio		P-value
		No.	(%)	No.	(%)	(95% CI)		
Previous abortion	Yes	21	(25.0)	43	(12.3)	1.9(-)		
	No	63	(75.0)	307	(87.7)	1.0	(1.0-3.4)	0.03
Bleeding in previous	Yes	20	(23.8)	37	10.6	2.0	(1.1-3.6)	0.02
pregnancy	No	64	(76.2)	313	(89.4)	1.0	(-)	
Bleeding in labour	Yes	15	(17.9)	37	(10.6)	1.5	(0.8-2.8)	
	No	69	(82.1)	313	(89.6)	1.0	(-)	
Previous Caesarean	Yes	11	(13.1)	15	(4.0)	13.8	(3.8-50.3)	
section	No	73	(86.9)	335	(96.0)	1.0	(-)	
Hypertension in	Yes	10	(11.9)	19	(5.4)	1.9	(0.9-4.2)	0.74
pregnancy	No	74	(88.1)	331	(94.6)	1.0	(-)	
Current pregnancy								
Parity	1	59	(41.2)	150	(30.0)	1.5	(1.0-2.1)	0.06
	2-4	74	(51.8)	237	(47.4)	1.0	(-)	
	5-14	10	(7.0)	113	(22.6)	0.5	(0.3-1.0)	
Birth spacing	1-36	39	(46.4)	216	(61.9)	1.0	(-)	
In months·	37-60	22	(26.3)	91	(26.0)	1.4	(0.7-2.6)	
	>60	22	(26.3)	43	(12.1)	2.9	(1.5-5.8)	0.002
Attended Antenatal care	Yes	128	(89.5)	485	(97.0)	1.0	(-)	
	No	15	(10.5)	15	(3.0)	3.8	(1.8- 8.0)	0.00
Booking time for	<28 wks	91	(71.6)	332	(68.6)	1.0	(-)	
antenatal (weeks)	28-36	37	(28.4)	153	(31.4)	0.3	(0.2 -0.7)	0.00
Number of antenatal	4+	71	(55.9)	195	(40.1)	1.0	(-)	
visits	<4	57	(44.6)	291	(59.9)	1.2	(0.8-1.7)	0.42
Having blood pressure	Yes	121	(85.3)	392	(80.8)	1.0	(-)	
checked during antenatal	No	21	(14.7)	93	(19.2)	2.2	(1.1-4.5)	0.00
Bleeding during this	Yes	3	(2.1)	3	(0.6)	3.4	(0.7-17.8	0 . 0 1
pregnancy	No	140	(97.9)	497	(99.4)	1.0	(-)	
Hypertension in this	71	(52.6)	7	(1.4)	77.7	(34.2-176.1)		0.00
pregnancy	No	64	(47.4)	493	(98.6)	1.0	(-)	
Referral from other	Yes	63	(44.1)	84	(16.8)	3.9	(2.6-5.8)	0.00
centers	No	80	(55.9)	416	(83.2)	1.0	(-)	
Sex of baby	Female	86	(60.1)	248	(50.2)	1.0	(1.0-2.2)	
	Male	57	(39.9)	252	(49.6)	1.5	(-)	0.04
HIV status	Negative	134	93.7	455	(91.0)	1.00	(-)	
	Positive	9	6.3	45	(9.0)	0.7	(0.3-1.4)	0.31

Table 3
Risk factors for severe pre eclampsia and eclampsia

Variable	Stratum	Cases N (%)	Controls N (%)	Crude odds ratio (95%CI)	Adjusted odds ratio (95%CI)	p-v
Distance from home	0-5	55(38.5)	333(66.0)	1.0(-)	1.0	
to mulago in (km)	5.1-10	57(39.9)	139(27.8)	2.5(1.6-3.8)	1.8(1.1-2.9) [a]	0.00
	>10	31(21.6)	28(5.6)	6.7(3.7-12.0)	3.8(1.9-7.7) [a]	
Patient jobs	Commerce	24(16.9)	104(22.8)	1.3(0.8-2.1)	1.9(1.0-3.7) [a]	0.00
	Working women	17(11.8)	14(2.8)	5.7(2.5-13.1)	8.3(3.0-23.1)	
	Peasant	102(71.3)	372(74.4)	1.0(-)	1.0(-)	
Type of house	Brick, plastered	78(54.5)	417(83.4)	1.0(-)	1.0(-)	
	Brick only	48(33.6)	69(13.8)	3.7(2.4-5.9)	4.5(2.7-7.5) [a]	0.00
	Mud only	17(11.8)	14(2.8)	6.5(3.1-13.9)	7.6(3.9-26.9) [a]	
Requesting for	Yes	75(67.8)	453(90.6)	4.6(2.9-7.3)	3.1(1.7-5.3) [a]	0.00
permission to visit	No	46(32.2)	47(9.4)	1.0(-)	1.0(-)	
HU	No	46(32.2)	47(9.4)	1.0(-)	1.0(-)	
Who pays for	Self and spouse	110(77.5)	460(92.0)	1.0(-)	1.0(-)	0.00
treatment	Others	33(22.5)	40(8.0)	4.4(2.6-7.3)	5.6(2.5-12.6)	
Family hypertension	Yes	75(52.5)	194(38.8)	1.7(1.2-2.5)	1.9(1.2-2.9) [a]	0.00
	No	68(47.5)	306(61.2)	1.0(-)	1.0(-)	
Existing	Yes	11(7.7)	2(0.4)	20.8(4.5-94.8)	26.9(4.3-170.4) [a]	0.00
hypertension	No	132(92.3)	498(99.6)	1.0(-)	1.0(-)	
Previous	Yes	10(11.9)	19(5.4)	1.9(0.9-4.2)	2.6(1.0—6.6) [b]	
hypertension in	No	74(88.1)	331(94.6)	1.0(-)	1.0(-)	0.05
pregnancy						
Previous abortion	Yes	21(14.7)	43(8.6)	1.9(1.0-3.2)	2.6(1.3-5.1) [b]	0.00
	No	122(85.6)	457(91.4)	1.0(-)	1.0(-)	
Previous Caeserian	Yes	11(7.7)	15(4.3)	3.4(1.4-8.2)	3.8(1.6-9.1) [b]	0.00
section	No	132(92.3)	335(96.4)	1.0(-)	(-)	
Number of	Nulliparious	59(41.2)	150(30.0)	1.5(1.0-2.1)	2.2(1.2-4.3) [c]	0.02
pregnancy	2-5	74(51.8)	237(47.4)	1.0(-)	1.0(-)	
	>5	10(7.0)	113(22.6)	0.5(0.3-1.0)	0.4(0.1-1.0) [c]	
Birth spacing in	<37	130(46.9)	195(61.9)	1.0(-)	1.0(-)	0.00
months	37-60	17(26.6)	82(26.0)	1.4(0.7-2.6)	1.1(0.4-2.9) [c]	
	>60	17(26.6)	38(12.1)	2.9(1.5-5.8)	8.3(2.6-26.4)[c]	
Antenatal care	Yes	128(89.5)	485(97.1)	1.0(-)		
	No	15(10.5)	15(3.0)	3.8(1.8-8.0)	3.4(1.4-8.5) c	0.00
Booking time for	<28	91(71.6)	332(68.6)	1.0(-)	1.0(-)	0.05
antenatal(weeks)	28-36	37(28.4)	153(31.4)	0.3 l (0.2—0.7)	0.4(0.2-1.0) [c]	
Having hypertension	Yes	71(52.6)	7(9.0)	77.7(34.2-176.1)	81.8(32.9-203.5) [c]	0.00
during pregnancy	No	64(47.4)	490(88.5)	1.0(-)	1.0(-)	
Having blood pressure	Yes	121(85.3)	392(80.8)	1.0(-)	1.0(-)	0
checked during	No	21(14.7)	93(19.2)	2.2(1.1-4.5)	2.5(1.2-5.2) [c]	
antenatal						

Continuation of Table 3

Admission to	Yes	20(14.0)	31(6.2)	2.5(1.4-4.5)	3.1(1.5-6.4)[c]	0.00
hospital	No	80(55.9)	416(83.2)	1.0(-)	1.0(-)	
Referral	Yes	63(44.1)	84(16.8)	3.9(2.6-5.8)	5.2(3.0-8.9)	0.00
	No	80(55.9)	416(83.2)	1.0(-)	1.0(-)	
Sex	Male	86(6.1)	248(49.6)	1.5(1.0-2.2)	1.5(1.0-2.3) [c]	
	Female	57(39.9)	252(50.4)	1.0(-)	1.0(-)	0.05

HU= health unit

a: All were adjusted for distance from home to Mulago hospital, patients job, type of house they were living in, transport used to hospital, person paying for treatment, age and asking for permission and family hypertension.

b: Adjusted for distance from home to Mulago hospital, patients job, type of house they were living in, transport used to hospital, person paying for treatment, age, asking for permission, family hypertension and existing hypertension,

c: Adjusted for Adjusted for distance from home to Mulago hospital, patients job, type of house they were living in, transport used to hospital, person paying for treatment, age, asking for permission, family hypertension and existing hypertension, previous scar and abortion

The patients who lived further a way from Mulago hospital had a higher risk of developing severe pre-eclampsia and eclampsia. The cases that lived between 10 and 15 kilometers from Mulago hospital had a four times risk for severe pre - eclampsia and eclampsia. (OR 3.8, 95% CI 1.9 - 7.7), while those who lived between five and ten kilometers had twice the risk of developing severe pre-eclampsia / eclampsia (OR 1.8, 95% CI 1.1 - 2.9). The cases that were working women (OR 8.3 95% CI 3.0 - 23.1) and those who carried out commercial duties (OR 1.9, 95% CI 1.0 - 3.7) when compared to peasants were associated with an increased risk of developing severe pre - eclampsia / eclampsia.

Cases with co - existing hypertension (OR 26.9, 95% CI 4.3 to 170.4) compared to those who did not, were associated with an increased risk of developing severe pre - eclampsia and eclampsia. Similarly those with a family history of hypertension were associated with an increased risk of pre eclampsia. (OR 1.9, 95% CI 1.2 - 2.9) and those with pre eclampsia in a previous pregnancy were associated with three times increased risk. A previous history of abortion was also associated with an increased risk of developing eclampsia when compared to those did not have (OR 2.6,95% CI 1.3 - 5.1).

Nulliparous women when compared with multiparous (two to five) women were associated with an increased risk of developing eclampsia (OR 1.8, 95% CI 1.1 - 3.0). While the grand multiparous (6 to 14) when compared to the multi parous were at a lower risk of getting eclampsia (OR 0.4 95% CI 0.2 to 0.9). Cases that delivered male babies compared to those who delivered female babies were at an increased risk of developing eclampsia (OR 1.5, 95% CI 1.0 - 2.3)

DISCUSSION

Majority of cases (89%) compared to (83%) controls were aged below thirty years. The ages of the women in study group were similar to the women who deliver in Mulago hospital (23). Teenage pregnancy was not a predictor of severe pre eclampsia although it has been reported to be associated with pre-eclampsia. (11, 18,24)

The patients who lived further a way from Mulago hospital had an increased risk of developing pre - eclampsia / eclampsia compared to those who lived within five kilometer radius. The reason for this could be that women diagnosed with pre - eclampsia in peripheral health units are referred to Mulago hospital and arrive with severe pre eclampsia or eclampsia. Similarly the referred patients in the study had an increased risk of five times of getting severe pre - eclampsia or eclampsia compared to those who were not referred (OR 5.2,95% CI 3.0 - 8.9).

Socio - economic class was measured using the type of house the patients lived in. The patients who lived in houses with bricks, not plastered and iron roof were associated with an increased risk of five fold (OR 4.5 95% CI 2.7 - 7.5), while those who lived in mud houses with or without iron roof were associated with greater risk of eight fold (OR 7.6, 95% CI 3.9 - 26.9) of developing eclampsia. The low socio - economic status was associated with severe pre - eclampsia and eclampsia possibly because of lack of antenatal care or poor health seeking behaviour leading to delay to come to hospital. Similarly the couples who could not afford to pay for their upkeep in the hospital and were associated with an increased risk of six times of

developing eclampsia compared to those who could afford (OR 5.6, 95% CI 2.5 - 12.6).

Working women had eight fold risk of developing severe pre-eclampsia compared to peasant women, while those in commerce had a doubling risk. The reason for this could be the stress women get by working predisposes them to severe pre eclampsia and eclampsia. Similar results have been reported from Mexico (18), and Australia (l9). The association between pre - eclampsia and working during pregnancy was related to stress and different levels of physical activity at work but not socio economic factors (18). The Ugandan women who participate in commercial work and possibly the workingwomen do not get enough time to rest and this predisposes them to pre - eclampsia.

Women with family history of hypertension had a doubling risk of developing pre - eclampsia and as expected patients with chronic hypertension had a risk of twenty seven fold of developing severe pre - eclampsia and eclampsia (OR 26.9, 95 % CI 4.26 - 170.4). Chronic hypertension is a predisposing factor for pre eclampsia and eclampsia. Both familial hypertension and chronic hypertension are known predictors for pre - eclampsia and eclampsia (6, 12, 25). Women with previous history of pre eclampsia had a trebling risk of developing severe pre - eclampsia and this confirms previous reports of increased risk associated with a history of pregnancy-induced hypertension (15,24,26).

Women with previous history of admission to hospital for any medical condition during pregnancy were associated with a trebling risk of developing pre - eclampsia and eclampsia compared to those who were not admitted at all (OR 3.1, 95%CIl.51 - 6.4). This was because they could have been admitted for hypertension, urinary tract infection which predisposes them to pregnancy induced hypertension.

Women with a previous history of abortion were associated with an increased risk of three times of developing eclampsia when compared with those who did not have abortion (OR 2.6, 95% CI 1.3 - 5.1).

Similar results have been reported by Trogstad (11). This was because the present pregnancy could have been by a different partner or have other underlying risk factors for pre - eclampsia which also cause abortion. Women who have had abortion were at risk of pre - eclampsia when the next pregnancy is not with the same partner (27).

Women with a history of previous delivery by Caesarean section had a risk of twenty two times of developing pre - eclampsia compared to those who delivered normally. Previous Caesarean section was done for previous morbidity including previous hypertension and this could be a measure of recurrence.

Nulliparity was associated with increased risk of pre - eclampsia and eclampsia by two folds. Many studies have reported nulliparity as a risk factor for severe pre eclampsia (6,12,13,26). This is because nulliparity is due to initial trophoblastic invasion and how the mother reacts to it. The failure of the normal invasion of trophoblastic cells leads to mal adaptation of the spiral arterioles, which are related to the causation of pre - eclampsia (9).

This study confirmed grand multi parity was a protective against pre - eclampsia (OR 0.41, 95% CI 0.18 - 0.97). Some studies have associated grand multiparity with increasing age and therefore increased risk for pre eclampsia. This study did not show this because there were few numbers aged above thirty five years to demonstrate any significant effect. However these results seem to suggest that it is the age more than multiparity which is a risk factor for pre - eclampsia.

Long birth interval of more than sixty months was associated with seven fold risk of developing pre - eclampsia. The reason for prolonged birth interval and pre - eclampsia was not quite clear but prolonged period could be due to factors such as change of paternity and possibly sub fecundity, which predispose to pre - eclampsia (28,29).

Non attendance of antenatal care was associated with a trebling risk of developing severe pre - eclampsia and eclampsia compared to those who attended antenatal care. Antenatal care is an important component of maternity care which screens those women who at risk or have developed pre - eclampsia so that they can be managed early to prevent complications like eclampsia. The screening of the women depends on the quality of antenatal care, the booking time and the number of visits by the patients. Those women who were diagnosed with hypertension in pregnancy during antenatal clinic were associated with an increased risk of developing severe pre - eclampsia and eclampsia (OR 81.8,32.9 - 203.5). The women diagnosed during antenatal attendance should have been managed to prevent this complication.

Women who delivered male babies were associated with double the risk of developing severe pre - eclampsia and eclampsia when compared to those who delivered female babies (OR 1.5 95% CI 1.0 - 2.3). The reason for this in not quite clear but similar results were reported by Basso and Olsen (28)

although studies have shown no statistical difference in total testosterone and free estriol values between women carrying male and female babies and pre - eclampsia suggesting that sex of foetus may not playa role in causation of the pre eclampsia (30).

The HIV positive test was low (6%) in cases compared to the controls (9%). This suggest that women need to be immune competent to develop pre - eclampsia and excludes the theory that HIV infection may have role in the pathogenesis of pre eclampsia. Similar results have been reported in South Africa (31,32). However a bigger study is needed to examine the effect of HIV on pre - eclampsia.

In conclusion, severe pre - eclampsia is one of the causes of maternal morbidity and mortality in Mulago hospital. The predictors of severe pre - eclampsia were chronic hypertension, family history of hypertension, low socio - economic status, nulliparity and delivering male babies. Health workers need to identify women at risk and offer them counseling and, those who have developed pre - eclampsia to be referred and managed in hospital with expertise and facilities. They should be delivered immediately when they develop severe pre - eclampsia so as to reduce the morbidity and mortality associated with this condition.

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