

Research Article

Pregnancy Outcomes among Preeclamptic Chinese and Burundian Women

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Keywords

- Preeclampsia
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- China
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- Hypertension

Abstract

Objective: This study aimed to describe pregnancy outcomes and diversity of care in preeclamptic Chinese and Burundian pregnant women.

Methods: Data from 137 Chinese preeclamptic patients who had been treated with MgSO₄ routinely during their hospitalization at the First Affiliated Hospital of Fujian Medical University located in P.R.China for the period of 2011 to 2013 and 46 Burundian preeclamptic patients who had never been treated with MgSO₄ during their hospital stay at Burundi University teaching hospital for the period of January 2012 to December 2012 had been retrospectively analyzed. Data were analyzed by using SPSS 18 software. P-value<0.05 was considered to be statistically significant at 95% confidence interval.

Results: All Chinese women (100%) were found to attend antenatal care, but only 67.4% of Burundian had the antenatal care visits (P<0.001). More Burundian rural residents women were detected to develop preeclampsia and most of them are referred by other hospitals (P<0.05). Among all women who had preeclampsia in those two countries, Burundian women had poorer outcome than Chinese. Complications such as eclampsia, renal dysfunction, HELLP syndrome and maternal death were significantly higher in Burundian women (P<0.05). By contrast, placental abruption and postpartum hemorrhage are more common in Chinese women, but the difference was not statistically significant. Oligohydramnios, neonatal respiratory distress, fetal intrauterine death, neonatal death and NICU admission were significantly different in the studied groups (P<0.05).

Conclusions: Poor maternal and neonatal outcomes are more likely to be seen in Burundian preeclamptic women and placental abruption and postpartum hemorrhage are commonly seen in Chinese preeclamptic but the main cause is unknown. MgSO₄ should be used routinely in preeclamptic patients to reduce maternal and perinatal adverse outcomes in developing countries such as Burundi.

ABBREVIATIONS

NICU: Neonatal Intensive Care Unit; BP: Blood Pressure; CHUK: Centre Hospitalo Universitaire de Kamenge; HELLP: Hemolysis Elevated Liver Enzyme Low Platelet; ALT: Alanine Transaminase; AST: Aspartate aminotransferase; WHO: World Health Organization; ACOG: American Congress of Obstetricians and Gynecologists

INTRODUCTION

Pregnancies outcomes are known to differ between Afro-American and white women. As preeclampsia is one of the leading causes of maternal and neonatal adverse outcome, it was important to analyze preeclampsia complications among

ethnically, geographically, socially and culturally different populations. The incidence of preeclampsia is estimated to be 2 % and 10% worldwide. Based on surveillance data, it is one of the five leading causes of maternal mortality in Burundi and worldwide [1]. According to WHO report, preeclampsia is estimated to be seven times higher in developing countries (2.8% of live births) than in developed countries (0.4%) [2,3]. In a multi-countries study conducted by Doctors without Boards, it was proven that preeclampsia /eclampsia is one of the factor associated with maternal death (Aor=42.9 ; P=0.17) in Sub-Saharan Africa [4].

Globally, thousands of women and babies die or get very sick each year from preeclampsia especially in developing countries,

such as Burundi where the maternal death is among the highest in the world 970 per 100000 of live births versus China 38 per 100000 of live births [2].

Moreover, preeclampsia affects the young women who have a long life expectancy ahead. It arises in the clinical context in which the adverse outcome will not be well accepted by the patient's relatives.

Preeclampsia is diagnosed when a previous normo-tensive pregnant women, after 20 weeks of gestation developed a BP higher than 140/90mmHg, with or without proteinuria according to ACOG (2013) new diagnostic guideline [5], with thrombocytopenia, pulmonary edema and lesion affecting the end organs like kidney, brain or liver. The mother and her fetus could be at high risk of adverse complications if the appropriate measures are not implemented earlier. The fact that there is no study conducted simultaneously in Burundi and China that looks at the extent of preeclampsia outcome and its contribution to maternal and perinatal morbidity and mortality, our study could provide additional information regarding preeclampsia outcome characteristics in those two countries population.

OBJECTIVE

The purpose of this study was to describe pregnancy outcomes and diversity of care in preeclamptic Chinese and Burundian pregnant women by evaluating maternal and perinatal outcomes in those two countries through a multi-factorial retrospective study done by collecting patient's data recorded in two different countries during the period from January 2012 to December 2012 for Burundian cases and from January 2011 to December 2013 for Chinese cases. With this research, we will establish the incidence of preeclampsia complications; assess maternal; perinatal outcomes in those two hospitals and highlight what should be done to reduce maternal and perinatal adverse outcomes' in developing countries.

MATERIALS AND METHODS

Description of the sample

This retrospective study is based on data collected from 137 Chinese preeclamptic patients who had been treated routinely with MgSO₄ during their hospitalization at the First Affiliated Hospital of Fujian Medical University located in P.R.China for the period of 2011 to 2013 and 46 Burundian preeclamptic patients who had never been treated with MgSO₄ during their hospital stay at Burundi University teaching hospital for the period of January 2012 to December 2012.

Data collection

Starting from the patient admission first day, the information was retrospectively retrieved from the medical files. Maternal age, maternal residence, previous medical history, parity, diastolic and systolic BP, the severity of the disease, complications related to the pregnancy, delivery mode and maternal physiologic factors were evaluated and compared to each other in the related population as the potential factors influencing maternal outcome. The maternal age was classified as <20, 20-30, 31-40, >40 years. The patients residence was divided into two categories: rural and urban. The patients with gestational diabetes, chronic

hypertension and renal disease were identified for the analysis. The patients parity was marked by nulliparous or multiparous. Regarding the maternal physiologic factors, the systolic BP was classified into 3 categories: <140, 140-160, > 160 and diastolic BP: <90, 90-110, >110mmHg. According to the discharge final diagnosis the patients with mild and severe preeclampsia were identified, each patient's complications and outcomes were noted. The patient's laboratory blood parameters were considered according to each country laboratory normal ranges. Elevated serum ALT (Burundi normal range <32U, China normal range: 13-69U), Elevated serum AST (Burundi normal range <31U, China normal range: 8-40U), Elevated serum Uric acid (China normal range: 149-369µmol/l, Burundi normal range: <350µmol/l), Thrombocytopenia (Burundi normal range: (110-350) 10⁹, China normal range: (110-350) 10⁹), Anemia (China and Burundi normal range (11-15g/dl), Elevated serum creatinine (Burundi normal range <90µmol/l, China normal range: 28-110µmol/l), Elevated serum urea (Burundi normal range: 1.7-9mmol/l, China normal range: 2.5-6.1mmol/l), Hyperglycemia (Burundi normal range: 3.89-6.10mmol/l, China normal range: 4.1 - 5.9 mmol/l). The maternal complications and outcomes were also analyzed. The gestational age at delivery, neonate Apgar score, gender, birth weight, intrauterine and extra uterine complications were analyzed and compared to each other in the related group as the possible factor influencing the neonate outcome. The delivery gestational age were classified into the following subgroups: <28 W+6days, 28-31W+6days, 32-34W+6days, 35-37W+6days, >37W+6days. The neonate with normal APGAR score were considered to have a score greater than 7 (APGAR>7: normal), and lower than 7 were considered as abnormal Apgar score. The neonate gender was considered for the evaluation. The neonates of lower than 2500 g were considered as low birth weight and the ones with the birth weight greater or equal to 4000g as high birth weight. Fetal and neonate complications and outcomes were analyzed.

Data statistical analysis

The data were transferred to SPSS 18 software. Distribution of socio-demographic, medical and pregnancy history, hospital stay days and cost, maternal outcome, neonatal outcomes characteristics and complications were analyzed. P-value<0.05 was considered to be statistically significant at 95% confidence interval. Data were analyzed to compare across groups of variables.

RESULTS

From January 2012 to December 2012 a total of 46 preeclampsia Burundian patients and from 2011 to 2013 a total of 137 preeclamptic Chinese patients data were collected from medical registers files. In those two countries, 183 preeclamptic patients fulfilled inclusion criteria and all had complete data. The data variations are described in the following manner:

Table 1 (Socio-demographic, medical and pregnancy history), Table 2 (Distribution of hospital stay days and cost), Table 3 (Maternal outcome), Table 4 (Maternal blood physiological parameter such as liver, renal function, platelet and Hemoglobin) and Table 5 (Neonatal outcome).

Table 1: Socio-demographic, medical and pregnancy history.

Characteristics	Burundian		Chinese		X2	P Value
	n =46	%	n = 137	%		
Maternal age (years):						
<20	4	8.7	2	1.5	5.686	0.017
20-30	25	54.3	77	56.2	0.048	0.826
31-40	15	32.6	54	39.4	0.679	0.410
>40	2	4.3	4	2.9	0.221	0.638
Rural resident	26	56.5	51	37.2	5.261	0.022
Attended ANC	31	67.4	137	100	48.663	0.000
Referred by other hospitals	28	60.9	30	21.9	24.160	0.000
G. Diabetes Millitus:	3	6.5	14	10.2	0.559	0.455
Chronic Hypertension	2	4.3	14	10.2	1.488	0.223
Renal disease	1	2.2	10	7.3	1.601	0.206
Nulligravity	25	56.5	65	47.4	0.656	0.418
Multigravity	21	43.5	72	52.6	0.656	0.418

Table 2: Mean hospital stays days and cost.

	Burundian	Chinese
Mean Hospital stay days	12.54	7.8
Mean Hospital stay cost	Free	11461¥

Table 3: Maternal outcomes.

	Burundian		Chinese		X ²	P Value
	n=46	%	n=137	%		
Systolic BP:						
<140	0	0	28	20.4	11.1	0.001
140-160	27	58.7	62	45.3	2.49	0.115
> 160	19	41.3	47	34.3	0.731	0.392
Diastolic BP						
<90	2	4.3	16	11.7	2.087	0.149
90-110	34	73.9	104	75.9	0.074	0.785
>110	10	21.7	17	12.4	2.384	0.123
Mild preeclampsia	16	34.8	43	31.4	0.182	0.67
Severe preeclampsia	30	65.2	94	68.6		
Eclampsia	14	30.4	1	0.7	40.382	0.001
HELLP	5	10.9	3	2.2	6.206	0.013
Placental abruption	0	0	3	2.2		0.312
Postpartum hemorrhage	0	0	10	7.3	3.552	0.059
Maternal death	2	4.3	0	0	6.022	0.014
C-section delivery	41	89.1	118	86.1	0.272	0.602
Vaginal delivery	5	10.9	19	13.9		
Retinal lesion	3	6.5	12	8.8	0.229	0.632

The following observations were made based on (Table 1 and histogram 1) regarding comparison of socio-demographic, medical and pregnancy history among preeclamptic Chinese and Burundian patients.

Maternal age: Most of the patients in the study were in

the age group 20-30 years, Burundian patients 25(54.3%) and Chinese patients 77(56.2%), followed by those of 31-40 years old, Burundian patients 15(32.6%) and Chinese patients 54(39.4%). Few patients were in the range of <20 years, Burundian patients 4(8.7%) and Chinese 2(1.5%). In the range of

Table 4: Maternal blood physiological parameters.

	Burundian		Chinese		X ²	P Value
	n=46	%	n=137	%		
Elevated serum ALT	10	21.7	8	5.8	9.816	0.002
Elevated serum AST	18	39.1	22	16.1	10.733	0.001
Elevated serum Uric acid	22	47.8	66	48.2	0.002	0.967
Thrombocytopenia	7	15.2	9	6.6	3.228	0.072
Anemia	11	23.9	40	29.2	0.478	0.489
Elevated serum creatinine	13	28.3	6	4.4	21.108	0.000
Elevated serum urea	6	13	21	15.3	0.143	0.705
Hyperglycemia	9	19.6	23	16.8	0.184	0.668

Table 5: Neonatal outcomes.

Characteristic	Burundian		Chinese		X ²	P Value
	n=46	%	n=137	%		
Delivery Gestational age : <28 W+6	1	2.2	6	4.4	0.455	0.5
Delivery Gestational age: 28 -31W+6	6	13	9	6.6	1.918	0.166
Delivery Gestational age: 32-34W+6	12	26.1	22	16.1	2.290	0.13
Delivery Gestational age: 35-37W+6	12	26.1	35	25.5	0.005	0.942
Delivery Gestational age: > 37W+6	15	32.6	65	47.4	3.081	0.079
APGAR score at 5min of 7 to 10	41	89.1	123	89.8	0.016	0.9
APGAR score at 5min of 4 to 6	1	2.2	4	2.9	0.072	0.788
APGAR score at 5 min of 0 to 3	4	8.7	10	7.3	0.095	0.758
Male Neonate	25	54.3	63	46	0.965	0.326
Female neonate	21	45.7	74	54		
Low-birth-weight (<2500 g)	31	67.4	63	46	6.317	0.012
Small for gestational age	19	41.3	38	27.7	2.956	0.086
High-birth-weight(> or =4000 g),	3	6.5	8	5.8	0.028	0.866
Fetal Intrauterine distress	13	28.3	26	19	1.77	0.183
Neonatal resp.distress	14	30.4	15	10.9	9.805	0.002
Jaundice	4	8.7	2	1.5	5.686	0.017
Fetal intrauterine demise	2	4.3	7	5.1	0.043	0.836
Neonatal death	8	17.4	8	5.8	5.760	0.016
Transferred to NICU	19	41.3	37	27	3.315	0.069
Oligohydramnios	7	15.2	5	3.6	7.521	0.006

<20years, Burundian patients compared with Chinese patients, the difference was statistically significant (P-value of 0.017). Few patients were also observed in the range of >40 years, Burundian patients 2 (4.3%) and Chinese patients 4 (2.9%).

Residential area: In Burundian preeclamptic patients, 26 (56.5%) of them are from the rural area and in 137 Chinese patients 51 (37.2%) are rural residents. Compared with Chinese patients, Burundian rural patients are at increased risk of developing preeclampsia. The difference was statistically significant (P-value 0.022).

Attended antenatal care or not: It was observed that most of the preeclamptic patients in Burundi did not attend the antenatal care 31 (67.4%). But in contrast, in Chinese patients all of them have attended the antenatal 137 (100%). The difference in the

two populations has statistic significance (P-value: 0.000).

Referred by other hospitals: According to the patients transfer related referral letter, 28 (60.9%) of Burundian patients and 30 (21.9%) of Chinese were referred to the high level of care by other medical institutions for getting good care. According to the severity of the disease, Burundian patients compared with Chinese patients were more likely to be referred by other hospitals. The difference was statistically significant (P -value 0.000).

Regarding Gestational Diabetes Mellitus, the distribution among preeclamptic Burundian patients was 3 (6.5%) and 14 (10.2%) among Chinese. The rate of gestational diabetes is higher in Chinese preeclamptic women but it does not have a statistical significance (P-value 0.445).

The data regarding the patient who had the history of chronic hypertension show that Chinese preeclamptic women 14(10.2%) are likely to have a history chronic hypertension compared to Burundian patient 4(4.3) .However the difference observed doesn't has a statistical significance .The renal disease is more 3 times common in Chinese patients 10(7.3%) than Burundian patients 1(2.2%). The result of the present study showed no significant difference between the two studied groups in view of renal disease.

Preeclamptic patients in Burundi were more likely to be nulligravid 25(56.5%) than Chinese preeclamptic patients 65(47.4%). However the studies did not show any statistic significance.

Table 2 demonstrates the hospital stay and cost, it was observed that in Burundi the care of pregnant women is free of charge. In China, First Affiliated Hospital of Fujian Medical University the mean cost of hospital stay for preeclamptic women was 11461¥ (about 1888.1 USD).

Table 3 demonstrate maternal outcomes. Among Preeclamptic Burundian, the research did not find any patient having the systolic BP<140 mmHg. In Chinese group, 28(20.4%) had systolic BP<140. The Chinese and Burundian are significantly different in term of having a systolic BP lower than 140 mmHg (P-value 0.0001) In view of having a systolic BP 140-160 mmHg and > 160mmHg the study did not find respectively a significant difference between Chinese 62(45.3%), 47(34.3%) and Burundian 27(58.7%), 19(41.3%).

In case of diastolic BP respectively < 90mmHg, 90-110mmHg and >110mmg, the two studied populations had no significant difference. However, it was observed that most of the patients were having a diastolic BP between 90-110mmHg on admission, Burundian group 34(73.9%) and Chinese group 104(75.9%). Regarding preeclampsia classification, the two populations had the same trend for developing severe preeclampsia. The Chinese patients who developed severe preeclampsia were 94(68.6%) and Burundian patients 30(65.2%). Eclampsia was more likely to be seen in Burundian patients 14(30.4%) vs Chinese patients 1(0.7%). In case of eclampsia, the difference between the population of those two countries were statistically significant(P-value 0.000).The rate of developing HELLP syndrome, was more commonly seen in Burundian 5(10.9 %). The difference between the two groups was statistically significant (P value: 0.013). Regarding the placental abruption and postpartum hemorrhage, Burundian patients were less likely to develop such complications compared to the Chinese population, but the difference was not statistically significant. The maternal death rate was high among Burundian patients 2(4.3%) and the difference observed was statistically significant (P-value 0.014).

The delivery mode was caesarian section in most preeclamptic patients in the those two studied groups and there was no significant difference in the distribution rate respectively in Burundian 41(89.1%) and Chinese118 (86.1%).The retinal complication was 3(6.5%) in Burundian vs 12(8.8%)in Chinese.

Table 4 present maternal physiologic blood parameter such as liver ,renal function etc .It was observed that the liver function impairment was more likely to be seen in Burundian

preeclamptic patients than in Chinese preeclamptic patients, the rate of having elevated serum liver enzymes was respectively ALT(Burundian : 10(21.7%) vs Chinese : 8(5.8%) (P-value 0.002); AST ((Burundian: 18(39.1%) vs Chinese: 22(16.1%) (P-value: 0.001). The difference was statistically significant. The serum uric acid distribution among the two groups had the same variation trend .There was no difference observed. The low platelet count was observed to be marked in Burundian group. However, the difference between the two populations did not have a statistical significance. Preeclamptic Chinese women are likely to be anemic compared to Burundian preeclamptic. But the study did not show a marked difference. In this research, the renal impairment was characterized by elevated serum creatinine. It was observed that 13(28.3%) Burundian was likely to develop renal dysfunction compared to Chinese population 6(4.4%). The study showed a statistically significant difference (P-value 0.000). Regarding serum urea, the variation trend was quite the same in the two groups. The blood glucose had no difference in preeclamptic Chinese and Burundian 9(19.6%). The study did not show any groups to be at increased risk of having hyperglycemia.

Table 5 are describing the neonatal outcome. Regarding the delivery gestational age, it was observed that there were few pregnancies terminated in the range of <28weeks+6days, the study found 1(2.2%) Burundian neonate vs 9(6.6%).However, according to the severity of preeclampsia, in the range of 32-34 weeks +6 days, 12(26.1%) pregnancies in Burundian patients were terminated vs 22(16.1%) Chinese pregnancies. The difference was not significant in the two populations. In the range of 35-37 weeks +6days, the rate of delivery was quite the same in the studied population. By comparing the two groups, it can be seen that more delivery are concentrated in the range of > 37weeks+6days, Burundian 15(32.4%) vs 65(47.4%) in Chinese groups. This can prove that in those two countries, the health care staffs are likely to prolong the pregnancy in preeclamptic patients.

In terms of Apgar score at 5min, the difference observed in the two countries neonates was not significant. Burundian neonates born with normal Apgar score: 7-10 were estimated to 41(89.1%) versus 123(89.8%) for Chinese neonates. By comparing neonates with Apgar score: 4-6, we found 1(2.2%) of Burundian neonates versus 4(2.9%) for Chinese neonates. The lowest Apgar score: 0-3 were more likely seen in Burundian neonates compared to Chinese neonates 4(8.7%) versus 10(7.3%), but the difference was not statistical significant. It was observed that more Burundian newborn from preeclamptic mothers were males 25(54.3%) and more Chinese neonates were female 74(54.3%). The difference was not statistically significant. Burundian preeclamptic women were more likely to deliver low birth weight infant compared to Chinese neonate 19(41.3%) versus 63(46%).The difference was statistically significant P value 0.012. The growth restriction with small for gestational age was more likely to be seen in Burundian 19(41.3%) versus 38(27.7%) for Chinese. Even if gestational diabetes was more likely to affect Chinese women, macrosomia or birth of a neonates of more than 4000g was slightly common in Burundian newborn 3(6.5%) versus 8(5.8%). Fetal intrauterine distress was higher in Burundian 13(28.3%) versus 26(19%) for Chinese neonates. Neonatal respiratory distress incidence was markedly high in Burundian 14(30.4%) versus 15(10.9%).

The difference was statistically significant P value 0.002. Jaundice was significantly high among Burundian compared to Chinese neonates 4(8.7%) versus 2(1.5%). P value 0.017. Fetal intrauterine demise was slightly higher in Chinese but the difference observed was not significant 2(4.3%) versus 7(5.1%). The incidence of neonatal death observed was more prominent in Burundian than Chinese neonate 8(17.4%) versus 8(5.8%) P value 0.016. More Burundian neonate were transferred to NICU compared to Chinese neonate 19(41.3%) versus 37(27%). It has been more reported that more Burundian women develop oligohydramnios 7(15.2) versus 5(3.6%). The difference was statistically significant P value 0.006.

DISCUSSION

The context of ethnic origin and culture background is frequently used to describe preeclampsia complications and pregnancy outcome: white, black, Asian [6] In the effort to elucidate the difference of preeclampsia pregnancy outcome among Chinese and Burundian pregnant women, we performed a retrospective study by collecting data from two referral hospitals located in two different countries: 46 cases of preeclamptic Burundian pregnant women and 137 of preeclamptic Chinese pregnant women. The strengths of this research were the strict selection of the ethnic origin and culture background of the population. However as this is a retrospective hospital based study, the possibility of information bias should be considered in the present research as the sample size is also small there could be probably be some potential candidates that were not included in the sample during the study period.

THE PRESENT RESEARCH HIGHLIGHTED THESE FINDINGS

- ◆ More Burundian women are not aware of the importance of antenatal care.
- ◆ Burundian preeclamptic women and their neonates are more likely to develop adverse outcomes compared to Chinese group.
- ◆ Postpartum hemorrhage is more common in preeclamptic Chinese women.

Most of preeclamptic women in both populations were in the range of 20-30years (54.3% of Burundian women vs 56.2% of Chinese women) pointing out that younger women are more affected by preeclampsia. This contrasts with the study of Lamminpää R et al where women of over 35 years had preeclampsia more often than younger women < 35 years [7].

As the social condition might not be equal in the two population, our study demonstrates that more Burundian women did not attend antenatal care, among whom only 67.4% had attended antenatal care, it could explain the reason why more cases of pregnancy adverse outcomes were observed in that group. This supports the findings of the study conducted in Taiwan, by Liu CM et al in 2012 in which perinatal morbidity and maternal complications in preeclampsia patients is associated with the type of prenatal care [8]. The management of severe preeclampsia requires highly qualified obstetrician and they are mainly concentrated in tertiary hospital. So it was observed that

a great number of Burundian patients (60.9%) were referred from other hospitals compared to Chinese patients (21.9%). The referral rate was significantly higher in Burundian (P-value 0.000).

Olivia Anselem et al compared preeclamptic white women, Africans women and Maghrebians, the nulliparity rate was lower in the Africans [9]. In our study, it was observed that the incidence of nulliparity was higher in Burundian women compared to Chinese women in which more preeclamptic patient were multigravid. This could be explained by the fact that as abortion is legalized in China, most of the women may had aborted before they decide to conduct a pregnancy to term. Many authors had estimated that nulliparity is not a risk factor of preeclampsia but the primipaternity [10]. Thus multiparity should not be considered as protective for preeclampsia before ruling out the history of change of partner.

Regarding maternal pre-existing diseases, chronic hypertension is likely to be a predisposing factor for developing preeclampsia. Sibai et al 1995 reported that black race was not a risk factor for developing preeclampsia [11] In our study, the rate of Chinese with chronic hypertension before pregnancy is slightly higher compared to Burundian women. However the difference was not statistically significant. The rate of gestational diabetes mellitus in the study was higher in Chinese women. This correlate with a research conducted by Shin Y.Kim and his associates, they found similar pattern of risk factor among asian women to gestational diabetes. The contribution of overweight and obesity to gestational diabetes risk varies by race/ethnicity and is considerably lower among Asian and highest among blacks. Although blacks may benefit the most from a reduction in obesity, interventions other than obesity prevention may be needed for groups such as Asians [12] Chronic renal disease is one of the predisposing risk factor of preeclampsia. It could lead to the maternal and fetal adverse outcome [13]. In our study; we found that more Chinese women (7.3%) are predisposed to renal disease before developing preeclampsia. But the difference between the two populations was not statistically significant. As many Burundian women did not attend antenatal care for screening high risk pregnancy, it is probable that, there are some Burundian women which may have pre-existing renal chronic disease but went unnoticed.

Obviously, the hospital stay, disease severity and financial implication are tightly linked. In our study, as Burundian women were more likely to develop severe preeclampsia and its related complications, the mean of hospital stay days (12.54 days) was higher compared to Chinese women (7.8 days) The total cost during the hospital was unknown because the care of pregnant Burundian women are free of charge. But for Chinese who must pay cash before receiving medical care, it was observed that the mean cost for caring preeclamptic patients was 11461¥ (about 1888.1 USD).

The level of Blood pressure is one of the sign used to describe the severity of preeclampsia. A Systolic arterial pressure higher than 160mmHg or diastolic arterial pressure greater than 110mmHg is considered as an alarming sign of preeclampsia [14]. As it had been reported by other studies [15], preeclamptic black race women have increased risk of developing blood pressure

higher than 160/110mmHg. It corresponds to the result of the present study. We found that Burundian women were more likely to have systolic blood pressures >160 mmHg. But regarding the rate of severe preeclampsia, there was no significant difference observed between Chinese women and Burundian women

Magnesium sulfate is one best drugs recommended by WHO to prevent eclampsia and it has been proven that the country in which is used, the maternal death was significantly reduced [5,14-17]. However, Burundi is one of the country in which magnesium sulfate is not routinely used to prevent eclampsia. Probably because Burundi does not have well trained staff for closely monitoring the patients in case MgSO₄ is used. In Burundi, Valium is the drug frequently used in case of eclampsia instead of MgSO₄. Our study had demonstrated that Burundian preeclamptic women were more likely to progress to eclampsia compared to Chinese women who routinely received magnesium sulfate as eclampsia prophylaxis (P-value: 0.000)

Consequently, the maternal mortality rate was higher in Burundian patients compared to Chinese patients in which there was no maternal death within the study period (P-value: 0.014). This corresponds to the WHO report in which Burundi has the highest maternal death versus China [2].

HELLP syndrome is one of the manifestations of severe preeclampsia. It had been reported that white and Chinese are at increased risk of developing HELLP syndrome [18]. In contrast, our study found that Burundian women had a high incidence of developing HELLP. The rate of HELLP in Chinese women in our research result is quite similar to the findings of a Chinese study conducted by Su Chu [19]. The difference among the two ethnic group was statistically significant (P-value <0.05).

Based on the nationwide inpatient Sample study, from between 2005 and 2008, conducted by Bryant and his associates, they had demonstrated that maternal race and postpartum hemorrhage relationship, they found a high rate of postpartum hemorrhage among Asian [20]. In our study, it was observed that the rate of Chinese women who had hemorrhage after delivery was significantly high compared to Burundian women (7.3% versus 0%). This suggest that postpartum hemorrhage may be more frequent in Chinese women.

The mode of delivery in preeclamptic depend on the gestational age, fetal presentation, cervical status and materno-fetal conditions [5] and it correlates to Burundi findings during our research. But in China, social issues are sometimes involved in choosing the mode of delivery, depending on the patient will. However, there was no significant different of caesarian section rate among the two population (89.1% for Burundian versus 86.1 for Chinese).

Biologic disturbances such elevated liver enzymes, thrombocytopenia, elevated serum creatinine and hyperglycemia was much frequent in Burundian women and those findings correlates with the high rate of HELLP among Burundian compared to Chinese (P value :0.000). However, the frequency of severe forms of preeclampsia did not differ significantly among the groups.

Preterm birth is defined as delivery before the completion

of 37 weeks [17]. Women with preeclampsia are at increased risk of delivering prematurely compared to women without preeclampsia. At some level, there are ethnic variations of prematurity according to the recent literature report [21]. Preterm delivery rates in a research conducted by A Vogel and his associates varied by race and ethnicity and slightly higher in Asians women compared to African American women (38.2% in African Americans and 38.9% in Asians.) [22] And this contrast with our findings where the rates of prematurity were high in Burundian compared to Chinese women .It was observed that 47.4% Chinese women and 32.6 % of Burundian women delivered after 37weeks +6days. However the difference was not statistically significant.

Low birth weight is defined as a delivering a newborn of a weight between 500g to 2500g [17]. The present study demonstrates a significant difference of low birth weight among the studied ethnic groups (P value :0.012). This corresponds to Fang J study in which by comparing pregnant hypertensive black and white women found that the incidence of low birth weight was highest among black babies and lowest among whites [23]. This finding may explain the placental abnormality during preeclampsia regardless of the ethnic origin [17]. There was no significant difference observed regarding Apgar score at 5min between babies of the studied groups.

Infant born prematurely are at high risk of vulnerable to other complications as it was observed in our study (neonatal respiratory distress, neonatal jaundice) which could lead to the newborn transfer to NICU or even neonatal death. As we have reported previously the high rate of prematurity and low birth weight among Burundian preeclamptic women, consequently, our study had demonstrated a significant high rate of neonatal death among Burundian women (17.4%) compared to Chinese women (5.8%). Regardless of ethnic origin, the present findings may have relationship with the quality of care in those two countries.

Oligohydramnios is probably induced by preeclampsia and could predispose the fetus to the growth restriction [24] and pulmonary hypoplasia. As the present study was investigating preeclampsia outcome, it was observed that Burundian women are more likely to develop oligohydramnios compared to Chinese women. The difference among the two populations was statistically significant. However our research did not rule out other potential cause of oligohydramnios such congenital abnormal etc.

The difference of preeclampsia outcomes according to geographic, cultural and ethnic origin should not be seen as evidence for the existence of genetic or environmental predisposition to preeclampsia induced complications. Such data must be interpreted with more caution because geographic, ethnic, cultural categories reflect also eating habit and socio-economic and medical care differences that have not been investigated in the present study.

CONCLUSION

The results of the present study have demonstrated the importance of MgSO₄ routinely use in preeclamptic patients at Fujian Medical University The First Affiliated Hospital and the

high rate of maternal and neonatal adverse outcomes in those preeclampsia patients who had never been treated with MgSO₄ at Burundi University teaching Hospital.

The incidence of antenatal care in preeclamptic Burundian women was significantly lower. The most common complications were eclampsia, HELLP syndrome, maternal death, elevated liver enzymes and elevated creatinine in the Burundian preeclamptic women; and placental abruption and postpartum hemorrhage were commonly seen in Chinese women. Burundian neonates were found to be highly affected by fetal respiratory distress, neonatal death and oligohydramnios. Poor quality of care in the management of preeclamptic women in Burundi is one of the causes contributing to maternal and neonatal morbidity and mortality. The reduction of maternal and neonatal morbidity and mortality in developing countries, such as Burundi, may rely on the promotion of antenatal care, MgSO₄ routinely use in preeclamptic patients and medical staff continuing education. Further research with large samples is needed to investigate why Chinese preeclamptic women are at increased risk of postpartum hemorrhage.

MAIN MESSAGES

More Chinese women are aware of the importance of antenatal care visits compared to Burundian women.

Poor outcomes are more frequently found in preeclampsia Burundian women.

Chinese preeclamptic women are more likely to develop placental abruption and postpartum hemorrhage compared to Burundian women

CURRENT RESEARCH QUESTIONS

Does comparing preeclamptic women maternal and neonatal complications enough to explain why preeclamptic Burundian women are more likely to develop adverse outcomes or should the difference in preeclampsia management in those two countries be evaluated too?

Does preeclampsia pregnancy outcome has any link with the patients education level?

Might further clinical and genetic research with large samples provide preeclampsia outcomes influencing factors in those two countries?

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