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Maternal – Fetal Outcome in Cases of HELLP Syndrome at the Delta State University Teaching Hospital

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: Hypertensive disorders of pregnancy (HDP) are a leading cause of maternal and perinatal morbidity and mortality in resource-poor nations like Africa. This is even more predicated in HELLP (Haemolysis, Elevated Liver enzymes and Low Platelets) syndrome, which is a life-threatening pregnancy complication and is usually considered to be a variant of preeclampsia. The present study therefore investigated maternal – fetal outcome in cases of HELLP syndrome at the Delta State University Teaching Hospital.
Study Design: The study is a descriptive retrospective investigation, which comprised 210 pregnancies complicated by HELLP syndrome, which were acquired from their separate medical records.
Place and Duration of Study: The study was carried out at the Delta state University Teaching Hospital (DELSUTH),Oghara, Delta State, Nigeria over a 24-month period.
Methodology: In newborn medical records, several outcome variables were evaluated. The gestational age was calculated using obstetric characteristics such as menstrual history, early clinic checkup, and ultrasound at 20 weeks of pregnancy.
Results: The average age of the mothers in the study was 29 years old, with a 95th percentile age of 40 years old. Preeclampsia risk was also enhanced by having more children. Preeclampsia is a condition that affects pregnant women who are more than 30 weeks pregnant. The HELLP syndrome has a significant impact on the outcome of the fetus. New stillbirth accounted for 4.6

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percent of fetal outcomes, whereas early neonatal death, which occurred within the first 28 days of life, accounted for 3.4 percent of the 210 participants in the study. In addition, 2.3 percent of stillbirths were macerated, and 10.3 percent of fetuses died in the womb.
Conclusion: There is a relationship between age and the occurrence of preeclampsia, according to the HELLP syndrome classification. In each age group, a minor percentage of the subjects (6%) had Class I HELLP syndrome, while the majority (60.5%) had Class II HELLP syndrome.

Keywords: Ecclampsia; preeclampsia; haemolysis; elevated liver enzymes; thrombocytopenia; hypertension; pregnancy.

1. INTRODUCTION

In Sub-Saharan Africa, the actual incidence of HELLP (Hemolysis, Elevated Liver Enzymes, Low Platelet Count) is unknown. This is primarily owing to a paucity of obstetric facilities, many of which do not have a pediatrician on staff and have inadequate laboratory capabilities. Hypertension in pregnancy has gained a lot of attention in terms of treatment because it's one of the possibly modifiable determinants of maternal mortality. Severe cases of this range, such as severe pre-eclampsia and eclampsia, have gotten a lot of attention, and there are a variety of treatment possibilities. Rarer diseases like HELLP syndrome have gotten less attention.

Although the cause of HELLP syndrome is uncertain, it is a life-threatening condition. Others, on the other hand, believe that HELLP is a kind of preeclampsia. Poor placental vascular remodeling during weeks 16-22 of pregnancy, when the second wave of trophoblastic invasion into the decidua occurs, causes insufficient placental perfusion in preeclampsia. HELLP syndrome is characterized by hemolysis, elevated liver enzyme levels, and low platelet counts [1]. There have been reports of malaise, nausea, vomiting, weight gain, and epigastric and right upper quadrant pain. It commonly develops in the third trimester of pregnancy and is characterized by a variety of symptoms. Headaches, eye problems, and jaundice are some of the less common symptoms [2,3]. Disseminated intravascular coagulopathy (DIC), bleeding, cardiac arrest, pulmonary edema, pulmonary embolism, hemorrhagic stroke, cerebral edema, acute renal failure requiring dialysis, hepatic hematoma with likely rupture, ascites, nephrogenic diabetes insipidus, and infection are all possible problems for the mother [4]. Prematurity and intrauterine growth retardation are the most common HELLP syndrome infant problems [4].

HELLP syndrome has a maternal mortality incidence of 1 to 3 % and a perinatal mortality rate of 35 % [3]. Class 1 or full HELLP, the most severe form of HELLP, is associated with the highest rates of perinatal morbidity and fatality. Class 1 patients account for 60% of all deaths, with cerebral hemorrhage being the most prevalent autopsy finding [5]. In Sao Paolo, Brazil, 318 women were chosen for a retrospective study to analyze the effects of PHS on maternal and perinatal outcomes, as well as to compare these women to those whose gestational hypertension or preeclampsia did not demonstrate HELLP syndrome abnormalities in laboratory testing. PHS was found in 41 women (12.9%), while it was not found in 277 women (87.1%). Preeclampsia was a more common kind of hypertension in the PHS group (Women with partial HELLP syndrome) than in the hypertension group. None of the women with isolated persistent hypertension developed PHS. Cesarean birth, eclampsia, and premature birth were all significantly greater in the PHS group than in the hypertension group. The purpose of the study was to assess the maternal–fetal outcome in HELLP syndrome cases at a tertiary health care facility in Delta State, Nigeria.

2. METHODOLOGY

2.1 The Study Area

The study, which was a descriptive retrospective study, was carried out at the Delta state University Teaching Hospital (DELSUTH), Oghara, Delta State, Nigeria. The Delta State University Teaching Hospital (DELSUTH) is a renowned and accredited University teaching hospital to the Delta State University (DELSU), Abraka. Located in Oghara, Ethiope West Local Government Area of Delta State, the hospital was built initially as a 180-bed ultra-modern specialist hospital. The duration of study was for a period of 24 months.

2.2 Data Collection

The total number of study participants with HELLP syndrome used in this study was 210; these were obtained from the records.

2.3 Operational Definition of Terms

Severe pre-eclampsia, is defined as the development of hypertension after 20th weeks' gestation, the diastolic pressure of 110 mmHg on admission, proteinuria 30 mg/dl in random urine specimen or 300 mg in a 24-h urine specimen. Imminent eclampsia would include cases of preeclampsia with symptoms of headache, blurring of vision and upper abdominal pain. Eclampsia is preeclampsia and occurrence of seizures.

Neonatal medical records were reviewed for several outcome variables. Gestational age is determined by obstetric criteria, including menstrual history, early clinic alevaluation, and ultrasonography at < 20 weeks of gestation where available. Respiratory distress syndrome (RDS) is defined by the presence ofcharacteristic radiographic findings and an oxygen requirement at 24 h after birth. Intraventricular hemorrhage (IVH) grade 3 is defined ashemorrhage with ventricular dilation, and IVH grade 4 as hemorrhage with parenchymal spread. Necrotizing enterocolitis (NEC) is defined bycharacteristic clinical symptoms with radiographic findings of pneumatosiscystoides intestinalis (grade 2) or pneumoperitoneum or portal air(grade 3). Fetal growth restriction (FGR) is definedas a birth weight below the 10th percentilefor the gestational age. Corticosteroid therapy refers to the use of either betamethasone or dexamethasone for fetal lung maturation and rangedfrom a single dose (at least 12 h before delivery) to a 48-hour course before delivery.

2.4 Data Analysis

Analysis of variance was performed at p = 0.05. The distribution of data was presented in the 85^{th} and 95^{th} percentile. The gestational age of the preeclamptic participants as well as SEM were presented. Means of biochemical parameters measured were determined according to age categories of pregnant mothers. The same was done for haematological parameters. Association between maternal age and occurence of preeclampsia based on classification of HELLP syndrome was determined. As well as association between gestational age and occurence of preeclampsia. Association with parity was also determined.

3. RESULTS AND DISCUSSION

The average age of the mothers in the study was 29 years old, with a 95th percentile age of 40 years old, according to Table 1. HELLP syndrome was shown to be more common in older mothers, according to the data. The impact of advanced maternal age (>35 years old) on preeclampsia women's maternal and perinatal outcomes was studied by Tyas et al. [6]. Preeclampsia patients with advanced maternal age had a higher risk of poor mother and neonatal outcomes, according to the researchers. Preeclampsia is four times more frequent in women over 35, often known as Advanced Maternal Age, than in women 25-29 years old [7]. Women aged 35-39 and 40 had a greater risk of preeclampsia than women of normal reproductive age in a similar study in China [8].

Similarly, having more children increased the chance of preeclampsia. In subjects with concomitant hypertension issues during pregnancy, the 95th percentile for parity was 5. Das et al. [9] discovered that parity is a risk factor for preeclampsia; the higher the parity, the higher the risk of preeclampsia, according to this study. Patients with preeclampsia had a gestational age of over 30 weeks. Preeclampsia, often known as HELLP syndrome, is a potentially fatal condition that occurs after the 20th week of pregnancy. Preeclampsia can arise at any point throughout the pregnancy or, in rare cases, after the baby is born [10]. The risk of severe preeclampsia reduced with gestational age, eclampsia climbed with gestational age, and the risk of HELLP syndrome was equivalent for preterm and term gestation, according to Lisonkova et al. [11]. The risk of eclampsia and severe preeclampsia at term has been associated to maternal age. Prenatal comorbidities and fetal congenital abnormalities have been associated to severe preeclampsia, haemolysis, high liver enzymes, low platelet count syndrome, and eclampsia during preterm gestation.

As shown in Table 2, fresh stillbirth accounted for 4.6 % of fetal outcomes, whereas early neonatal death accounted for 3.4 % of the total 210 participants in the study. Also observed were 2.3 % macerated stillbirths and 10.3 % intrauterine fetal death. For 11.4% of the study population, there were no additional maternal-foetal complication aside from HELLP syndrome.

When biochemical indicators for evaluating liver function in the patients were examined, the results revealed signs of elevated liver enzymes, with the severity being greater in those over the age of 30 (Table 3). The ALT levels of

preelamptic mothers under 30 years old ranged from 81.41 to 83.35 units. For adults aged 35 to 39, the average ALT was 174.29 units. According to Davis and Shiel Jr. [12], elevated amounts in the blood may signal liver impairment, among other things, because the liver synthesizes the most ALP (alkaline phosphatase) enzyme. ALP concentrations in the blood range from 45 to 115 micrograms per liter. However, there was evidence of increase in the preeclamptic individuals (128.00 – 199.04 U/L). An increase in Gamma-glutamyl transpeptidase, GGT (53.97 – 105.00 U/L) was also seen. This enzyme's abnormal level is thought to indicate the possibility of liver injury; the higher the abnormal level, the more likely liver damage is. GGT concentrations in the blood range from 9 to 48 micrograms per liter [12].

Fig. 1 shows the gestattional age of the preeclamptic participants. Age range was between 32 and 36 years. They did not significantly differ from one another (p>0.05).

Table 1. Presentation of maternal age, parity and gestational age of study participants

	*Mother's age (yrs)	*Parity	*Gestational age (wks)
Mean	29	2	34
85th perc.	37	4	39
95th perc.	40	5	40

**mean presented to the nearest integer*

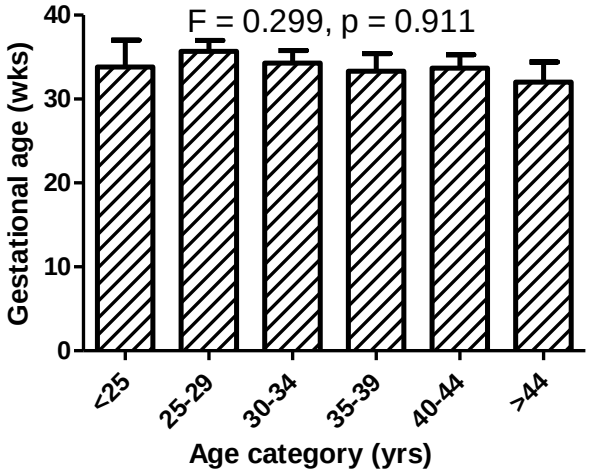

Fig. 1. Gestational age distributed by the maternal age categories

Table 2. Maternal-fetal complication

Maternal-fetal complication	Total N = 210	
	N	(%)
Fresh still birth	10	4.6
Early neonatal death	7	3.4
Macerated still birth	5	2.3
Intra uterine fetal death	22	10.3
Death	2	1.1
Status epilepticus	2	1.1
HELLP syndrome only	24	11.4
Post partum eclampsia	38	18.3
Disseminated Intravascular Coagulation	2	1.1
Cerebro- vascular accident	7	3.4
Retroviral disease	2	1.1

Table 3. Distribution of biochemical parameters for liver function as presented according to age categories of pregnant mothers

Age category	(n)	ALT	ALP (U/L)	GGT (U/L)	TP	Albumin (g/dL)	TB (mg/dL)	CB
Normal range	-	7 - 56	45 -115	9 – 48		3.5 - 5	0.1 - 1.0	
<25	45	83.35	187.37	69.37	6.32	2.97	1.59	0.91
25-29	37	81.41	194.24	59.17	6.41	3.34	2.40	1.34
30-34	49	113.17	199.04	53.97	6.22	2.98	1.09	0.48
35-39	37	174.29	163.07	64.00	6.31	3.15	2.89	0.51
40-44	21	109.33	129.00	59.00	7.87	3.33	1.05	0.37
>45	21	103.00	128.00	105.00	7.10	2.70	0.60	0.20
Total	**210**							
F	-	0.779	0.575	0.424	0.968	0.729	0.686	0.538
p-value	-	0.568	0.719	0.831	0.443	0.604	0.635	0.747

Table 4. Haematological parameters as presented according to age categories of pregnant mothers

Age category	PCV (%)	Platelet count (x 10^3) per (µL)	Systolic bp (mm Hg) (upper #)	Diastolic bp (mm Hg) (lower #)
Normal range	30 – 46	150 – 400	<120	<80
<25	32.24	114.39	190.95	119.11
25-29	34.00	87.35	196.47	122.06
30-34	31.16	91.86	191.96	115.92
35-39	30.79	81.00	194.64	113.29
40-44	30.70	87.33	194.67	118.33
>44	35.60	110.00	190.00	120.00
F-statistic	0.641	1.882	0.155	0.906
p-value	0.669	0.108	0.978	0.482

Table 5. Distribution of biochemical parameters for kidney function assessment presented according to age categories of pregnant mothers

Age category	Na	K	Urea	Cr	Urine pH	Urine SG
<25	135.11	3.44	25.92	1.53	6.08	1.03
25-29	136.47	3.86	24.96	1.29	6.00	1.03
30-34	137.92	3.78	29.04	1.09	6.06	1.03
35-39	129.43	3.84	31.63	1.84	5.96	1.03
40-44	134.00	3.60	20.00	0.87	6.00	1.03
>44	137.00	3.50	23.00	0.90	5.50	1.03
F	0.897	1.093	0.292	0.576	0.203	0.334
Sig.	0.488	0.372	0.916	0.718	0.960	0.891

When compared to the typical range of 150–400 x 10^3/µL, all preeclamptic women had normal PCV (30.70–35.60 %). However, they had a lower platelet count (87.33–114.39 x 10^3/µL), which was indicative of HELLP syndrome (Table 4). Blood pressure levels were elevated in all age categories. Sodium levels in the participants was 129.43 – 137.92 units indicative of hypernaturamia (Table 5). There was also a possium content of 3.44 – 3.86 units. These values were not influenced by age. Urea was highest within the 35 – 39 yrs age category (31.63 units). pH levels in the participants minimally differed ($p>0.05$) among the age categories; values ranged from 5.50 – 6.08.

Association between age and occurrence of preeclampsia based on classification of HELLP syndrome has been presented on Table 6. A minority of the participants within the age categories had Class I HELLP syndrome (< 6% of the total participants), where as a majority (60.5%) of the group had Class II HELLPS. With a Crammer's V value of 0.381, $p=0.001$, it is

convenient to state that there was significantly strong association between age categories and the Classification of HELLP syndrome. However, there was no significant association between the occurrence of HELLPS and gestational age (Cramer's V = 0.142, p= 0.835) (Table 7). Generally, however, participants with gestation age of between 31 – 40 years showed stronger association with the occurrence of HELLPS (Table 7). Occurrence of HELLPS did not significantly affect parity as there was no association between parity and HELLPS classification (Cramer's V = 0.279, p= 0.174). However, participants with a parity of one were more likely to have been influenced by the occurrence of HELLP syndrome. Williams and Wilson [13] looked at whether the frequency of HELLP syndrome and small for gestational age newborns in moms with preeclampsia and gestational hypertension differed by gravidity and parity in women with preeclampsia and gestational hypertension. They discovered that preeclamptic primigravid primiparous and multigravid primiparous women had similar clinical hypertension difficulties, but the primiparous women had a higher prevalence of HELLP syndrome than the multiparous women. The number of hypertensive pregnant women who developed problems changed depending on parity, but not gravidity. The pregnant hypertensive groups showed similar hypertension-related clinical symptoms.

A retrospective analysis of the medical records of patients with HELLP syndrome was evaluated [13]. These women had been hospitalised for preeclampsia/eclampsia and had HELLP syndrome documented. In the study [13], 8.3 percent of the participants had HELLP syndrome. At the time of delivery, the average gestational age was 32.4 weeks. 42 percent of the patients had 32-week births, and 28 % had IUGR.

Table 6. Association between maternal age and occurence of preeclampsia based on classification of HELLP syndrome

Age category		HELLP (Class)			Total
		Class I	Class II	Class III	
<25	Count	0	22	23	45
	% within group	0.0%	48.9%	51.1%	100.0%
25-29	Count	6	15	16	37
	% within group	16.2%	40.5%	43.2%	100.0%
30-34	Count	2	32	15	49
	% within group	4.1%	65.3%	30.6%	100.0%
35-39	Count	2	31	4	37
	% within group	5.4%	83.8%	10.8%	100.0%
40-44	Count	0	15	6	21
	% within group	0.0%	71.4%	28.6%	100.0%
>44	Count	1	12	8	21
	% within group	4.8%	57.1%	38.1%	100.0%
Total	Count	11	127	72	210
	% within group	5.2%	60.5%	34.3%	100.0%

Symmetric Measures, Cramer's V = 0.381, p= 0.001; Phi = 0.270, p= 0.001

Table 7. Association between gestational age and occurence of preeclampsia based on classification of HELLP syndrome

Class		Gestational age range					Total
		21 - 25 wks	26 - 30 wks	31 - 35 wks	36 - 40 wks	41 - 45 wks	
Class I	Count	1	1	4	5	0	11
	% within group	9.1%	9.1%	36.4%	45.5%	0.0%	100.0%
Class II	Count	4	24	50	45	4	127
	% within group	3.1%	18.9%	39.4%	35.4%	3.1%	100.0%
Class III	Count	3	10	24	33	2	72
	% within group	4.2%	13.9%	33.3%	45.8%	2.8%	100.0%
Total	Count	8	35	78	83	6	210
	% within group	3.8%	16.7%	37.1%	39.5%	2.9%	100.0%

Symmetric Measures, Cramer's V = 0.142, p= 0.835

Table 8. Association between parity and occurence of preeclampsia based on classification of HELLP syndrome

HELLP		Paraity							Total
		1.00	2.00	3.00	4.00	5.00	6.00	7.00	
Class I	Count	6	3	0	0	1	0	1	11
	% within group	54.5%	27.3%	0.0%	0.0%	9.1%	0.0%	9.1%	100.0%
Class II	Count	41	29	23	19	11	2	2	127
	% within group	32.3%	22.8%	18.1%	15.0%	8.7%	1.6%	1.6%	100.0%
Class III	Count	35	15	11	3	5	2	1	72
	% within group	48.6%	20.8%	15.3%	4.2%	6.9%	2.8%	1.4%	100.0%
Total	Count	82	47	34	22	17	4	4	210
	% within group	39.0%	22.4%	16.2%	10.5%	8.1%	1.9%	1.9%	100.0%
Symmetric Measures, Cramer's V = 0.279, p= 0.174									

The most common reason for NICU admissions was respiratory distress syndrome (33.9 %). The PNM rate was a whopping 20%. The maternal morbidity rate was 34%. Abruptio placentae (36.4 percent) and DIC were the most prevalent maternal problems (31.8 %). There was no death of the mother [14].

4. CONCLUSION

HELLP syndrome is one of the most common causes of maternal and neonatal death. The need to see if some prenatal traits attributed to women, such as HELLPS exposure, are linked to prenatal features attributed to the unborn. The average age of the mothers in the study was 29 years old, with a 95th percentile age of 40 years old. A larger number of older mothers were reported to have HELLPS. A relationship has been identified between maternal age and HELLP syndrome.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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