

**Clinical Audits of Sever pre-eclampsia Management at South Valley University Hospitals**

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**Abstract**

**Background:** Clinical audits based on standard criteria have been used in developed countries to improve the management of certain diseases as pre-eclampsia and eclampsia. It has been introduced nowadays in the assessment of diseases in developing countries

**Objectives:** To assess the management of severe pre-eclampsia in South valley university Hospitals.

**Patients and method(s):** This clinical audit was conducted on pregnant women who had severe pre-eclampsia from those admitted to Obstetrics & Gynecology department of South Valley University Hospitals during the period from September 2016 to September 2020. Patients were diagnosed as severe preeclampsia according to RCOG criteria 2019.

**Results:** The study was conducted on 150 patients who had severe preeclampsia. The results showed 70% of patients were primigravida and old age, 40% of patients received corticosteroid within 7 days before termination, 50% of patients received Magnesium sulphate, 60% of patients were admitted to ICU. 70% of patients were not terminated before 37 weeks.

**Conclusion:** Learning doctors about symptoms, signs and complications of severe preeclampsia, patients with severe preeclampsia should be admitted to hospital, do investigations 3 times per week. Measurement of blood pressure (BP) every 15-30 minutes until BP less than 160/110 then 4 times / day. Use the suitable antihypertensive drug as labetalol as first line, then nifedipine. Women with severe preeclampsia should be admitted to ICU. Intravenous sulphate should be taken.

**Keywords:** Severe pre-eclampsia; management.

**DOI:** 10.21608/svuijm.2022.125060.1290

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**Received:** 11 March, 2022.

**Revised:** 19 April, 2022.

**Accepted:** 20 April, 2022.

**Cite this article as:** Tahany Fathy, Mahmoud Almolakab B Alrashedy, Mahmoud Iwes, Mohammad AM Ahmed. (2022). Clinical Audits of Severe pre-eclampsia Management at South Valley University Hospitals. *SVU-International Journal of Medical Sciences*. Vol.5, Issue 2, pp: 200-208 .

## Introduction

Pre-eclampsia is a pregnancy disorder diagnosed by increase in blood pressure and presence of a significant amount of protein in urine (NICE, 2019). The disease usually occurs in the last trimester of gestation and becomes worse over time. In severe cases there may be thrombocytopenia, elevated liver enzymes, impaired kidney function, edema, dyspnea due to pulmonary edema, or visual defects. Pre-eclampsia has poor outcome and negative effect on the mother and the fetus. In case of negligence in treatment, patient became eclamptic who has convulsions (WHO, 2018).

Clinical audit is a process of quality improvement which seeks to improve care of patient and his outcomes through systematic review of care against the explicit criteria and implementation of change. The structure, processes and outcomes aspects of care are selected and systematically evaluated against explicit criteria. When indicated, changes are implemented at an individual team, or service level then further monitoring is used for improvement confirmation in delivery healthcare (Novo et al., 2005).

The incidence of preeclampsia in the United States is estimated to range from 2% to 6% in healthy, nulliparous women. Among all cases of the preeclampsia, 10% occur in pregnancies of less than 34 weeks' gestation. The global incidence of preeclampsia has been estimated at 5-14% of all pregnancies (Xiaoshuet al., 2017). In developing nations, the incidence of the disease is reported to be 1.8%-16.7 % with hypertensive disorders being the second most common obstetric cause of stillbirths and early neonatal deaths in these countries (Lakewet al., 2013)

The incidence of preeclampsia is higher in women with a history of preeclampsia, multiple gestations, and chronic hypertension or underlying renal disease. In addition, Lykke et al found that preeclampsia, spontaneous preterm delivery, or fetal growth deviation in a first singleton

pregnancy predisposes women to those complications in their second pregnancy, especially if the complications were severe (Lykke et al., 2010). The International society for the study of **hypertension in pregnancy, (2019)** (ISSHP) recommends that pregnant women with de novo hypertension are investigated with laboratory tests measuring hemoglobin, platelet count, serum creatinine, liver enzymes, and serum uric acid to determine the presence of maternal organ dysfunction and the diagnosis of preeclampsia .

New guidelines have also implemented PIGF (placental growth factor) or sFlt-1: PIGF ratio testing for preeclampsia diagnosis in specific circumstances. There is a large body of work indicating a role of circulating angiogenic factors, such as sFlt-1 and PIGF, in the pathogenesis of preeclampsia. Women with preeclampsia have higher circulating levels of sFlt-1 and lower levels of PIGF, noticeable before the onset of the disease (Sayuriet al., 2017).

The International Society of Ultrasound in Gynecology and Obstetrics on October 15, 2018. International Society of Ultrasound in Obstetrics and Gynecology issued guidance on ultrasound for pre-eclampsia on October 15, 2018 (Shelly et al., 2019).

The pulsatility index (PI) should be used for examination of uterine artery resistance in the context of preeclampsia (PE) screening. The most efficient screening model for identification of women at risk of PE seems to be a combination of maternal factors, maternal mean arterial blood pressure, uterine artery Doppler, and placental growth factor (PIGF) level at 11-13 weeks (Solhildet al., 2017)

When preeclampsia with severe features is diagnosed after 34 weeks gestation, delivery is most appropriate. The mode of delivery should depend on the severity of the disease and the likelihood of a successful induction. Whenever possible, however, vaginal delivery should be attempted and cesarean section should be reserved

for routine obstetric indications (Kate et al., 2018).

### Patients and methods

This study was retrospective Observational study that was submitted for All patients admitted to Obstetric department at south university hospital who are diagnosed of Having sever preeclampsia (according to RCOG) during the period from September 2016 to September 2020 we included All pregnancies conceived naturally or through ART and all pregnancies with blood pressure more than 160/110 discovered during antenatal care we excluded Diabetic patients and patients with other organic diseases

Data collected through direct contact personal contact positions direct observation of caregivers patient interactions and attitudes and also from the clinical records then recording the data and special sheet list. Date from patient and review of medical records of women admitted to the obstetric and gynecological department searching the following

### Audits criteria

- 1-Risk stratification during prenatal and antenatal care
- 2- Preventive measures used for high risk women
- 3-Criteria used for diagnosis of sever preeclampsia: SBP of 160 mm Hg or higher or DBP of 110 mm Hg or higher, on two occasions at least 4 hours apart while the patient is on bed rest (unless antihypertensive therapy has previously been initiated), proteinuria (i.e.  $\geq 30$  mg/mol, protein, creatinine ratio  $\geq 300$  mg/24 hour; or  $\geq 2$  + dipstick) and other maternal organ dysfunction, including: acute kidney injury (creatinine  $\geq 90$   $\mu$ mol/L; 1 mg/dL). Liver involvement (elevated transaminases, e.g. alanine aminotransferase or aspartate aminotransferase  $>40$  IU/L) with or without right upper quadrant or epigastric abdominal pain; neurological complications (e.g. eclampsia, altered mental status, blindness, stroke, clonus, severe headaches, and persistent visual stomata); or hematological complications (thrombocytopenia–platelet count)

4- Multidisciplinary team inclusion of consultant obstetrician's seniors, senior pediatricians, seniors intensive care in the management plan of each patient

5-Base line investigation according to guidelines (CBC, Liver function, urine analysis)

6- Follow up maternal condition, clinical and laboratory

7- Follow up of fetal condition (ultrasound, CTG)

8-Management of hypertensive drugs, follow up fluid management

9- Timing of termination of pregnancy

10- Causes of termination of pregnancy

11- Complication during antenatal admission (IUFD, Eclampsia)

12 –Complication during surgery

13 -Complication during postpartum period

14- Use of Mg sulphate during, after delivery or fits, dose, Timing, duration, indication

15- Management of complications

17-ICU admission

17-Follow up during recovery (Bp, Proteinuria, complications)

18-Postnatal counseling, contraceptive future

19- NICU admission and Fetal, Neonatal outcome

Data were be analyzed and will be compared to the audit criteria.

Each point in the management of preeclampsia in the current practice were compared to the standard international practice to identify the gap between what is the actual and the ideal practice

### Statistical analysis

The collected data were summarized as mean  $\pm$  Standard deviation (SD) and range for numerical data, and frequency and percentage for categorical data. Comparisons between the different study groups were carried out using the Fisher Exact Test (FET) to compare categorical data. The independent Student t- test (t), Mann-Whitney test (z), and the Kruskal Wallis test (x<sup>2</sup>) to compare none normally distributed data as appropriate. Characteristics. P-values  $< 0.05$  were considered statistically significant. The statistical analysis was conducted using STATA/SE version

1 1 .2 for Windows (STATA corporation, College Station, Texas)

## Results

The research included 150 patient with sever preeclampsia

**Table 1. Distribution of studied sample according to patient's demographics data and Blood pressure**

Variables	Number	Percent
<b>Age (years)</b>		
>30	105	70%
<30	45	30%
Range	18-39	
Mean±S.D.	26.96±5.186	
<b>Parity</b>		
Primigravida	84	56%
Multigravida	66	44%
<b>Gestational Age (weeks)</b>		
Range	29-38	
Mean±S.D.	33.52±2.825	
	<b>Blood Pressure</b>	
<b>Systolic</b>		
Range	140-200	
Mean±S.D.	153.60±12.493	
<b>Diastolic</b>		
Range	100-120	
Mean±S.D.	92.60±6.285	

This show no significant difference as the study showed 105 patients were old age >30 and 66 patients were primigravida. And show there was

no significant difference as patients had systolic BP between 140-200 and Diastolic BP 100-120

**Table 2. Distribution of studied sample according to patient's Laboratory investigation:**

Variables	Baseline	Follow up	P value
<b>Hb</b>			
Range	10.0-12.5	9.0-12.5	1.000
Mean±S.D.	11.54±0.676	11 ±0.676	
<b>Platelet</b>			
Range	80-456	169-456	1.000
Mean±S.D.	223.76±44.132	223.76±44.132	
<b>ALT</b>			
Range	12-160	11-80	<0.001*
Mean±S.D.	29.26±6.790	34.70±9.660	
<b>AST</b>			
Range	11-100	12-64	<0.001*
Mean±S.D.	33.70±12.300	38.94±14.333	

The study showed by investigation that most of the patients complicated with HELLP syndrome

(elevated liver enzyme, low platelet and hemolysis)

**Table 3. Distribution of studied sample according to patient's Maternal and fetal management and monitoring:**

Audit criteria	Yes		No	
	Number	Percent	Number	Percent
Hospital admission	150	100	0	0
BP Measurement every 15-30 minute until BP less than 160/110 then 4 time / day	150	100	0	0
Dipstick Proteinuria test daily while admitted	150	100	0	0
Follow up investigation 3 time per week	150	100	0	0
Corticosteroid within 7 day in before termination	60	40.0	90	60.0
Use of labetalol first then nifedipine during pregnancy	45	30	105	70
Fetal assessment Ultrasound every 2 week	150	100	0	0
CTG if indication	45	30.0	105	70.0

The study showed there was significant difference as regard the use of corticosteroid, the study showed 40% of patients received corticosteroid within 7 day before termination. It showed also 100% of patients did Dipstick proteinuria test but

not daily only during admission. That found also 70% of cases didn't use CTG for assessment of the fetus. There founded 70% of patients did not use labetalol first as antihypertensive drug when BP >150/100 during pregnancy.

**Table 4. Distribution of studied sample according to patient's preeclampsia management:**

Audit criteria	Yes		No	
	Number	Percent	Number	Percent
Intravenous magnesium to women with Severe Preeclampsia	75	50.0	75	50.0
Don't use Diazepam alternative with magnesium	69	46.0	81	54.0
Don't use Dexamethasone for treatment HELLP syndrome	69	46.0	81	54.0

The study showed 50% of patients received magnesium sulphate more than half of patients did

not use dexamethasone for treatment of HELLP syndrome.

**Table 5. Distribution of studied sample according to patient's management of delivery, and postpartum management**

Audit criteria	Yes		No	
	Number	Percent	Number	Percent
Termination before 37	45	30.0	105	70.0
Termination at 37 week initiate birth at 24/48 hour	105	70	45	30
Decision of senior obstetricians	150	100	0	0
Team of anesthesiologist including in decision	150	100	0	0
Team of pediatricians including in decision	150	100	0	0
ICU admission	90	60.0	60	40.0

Antihypertensive drug if BP >150/100 (Labetalol first, Nifedipine and IV hydralazine) after birth	63	42.0	87	58.0
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The study showed 70% of patients were not terminated before 37 weeks. The decision of termination of pregnancy was taken by 100% decision of senior obstetrician in presence of team of anesthesiologists and team of pediatricians. Only 60% of patients were admitted to ICU. There founded 58% of patients did not use labetalol first as antihypertensive drug when BP >150/100. It

was also found that 62% of patients didn't receive aspirin daily until birth. And 36% of patients did not measure blood pressure 4 time /day for 2 week after birth. It was also found that 62% of patients didn't receive aspirin daily until birth. The study showed 58% of patient did not receive labetalol first as antihypertensive drug after birth.

**Table 6. Distribution of studied sample according to patient's discharge and follow up:**

Audit criteria	Yes		No	
	Number	Percent	Number	Percent
Investigation after birth 48/72 hour if normal don't repeat	150	100	0	0
After birth measurement BP 4 time/day up to 2 week	96	64	54	36
Offer woman with PET a medical review with their GP specialist 6/8 week after birth	69	46.0	81	54.0
Aspirin 75-150 daily for 12 week until birth for high risk (Previous Preeclampsia chronic renal disease, first pregnancy age >40 years)	57	38.0	93	62.0
Patient consent	150	100	0	0

The study showed 36% of patients did not measure blood pressure 4 time /day for 2 week

## Discussion

Pre-eclampsia has negative effects on outcomes for both the baby and the mother. In case of negligence in treatment, the disease may lead to eclampsia which is characterized by presence of convulsions. An earlier survey of risk factors for maternal mortality at the study centre implicated the quality of care in about 40% of maternal deaths.

Clinical audit was defined as the critical and systematic analysis of the medical care quality, involving the methods that used for diagnosis and treatment, as regard to available resources and the resulting patient health outcome beside his quality of life.

after birth. It was also found that 62% of patients didn't receive aspirin daily until birth.

Clinical audits use some criteria to permit numerical comparison of actual practice patterns versus these criteria. The key component of clinical audit is that performance is reviewed to ensure that what should be done is being done, and if not it provides a frame work to enable improvements to made.

Audit of obstetric care has become routine practice in many western countries but is slowly adopted in a number of developing countries. In developing countries there is so far little documented experience with audits of medical care, not only obstetric care. As developing countries face a number of constraints that may prevent the successful implementation of the audit.

The study showed that Our patients` age ranged from 18-39 years with mean value  $26.96 \pm 5.186$  years. More than half of studied sample were primigravida. Gestational Age ranged from 29-38 weeks with mean value  $33.52 \pm 2.825$  weeks.

Systolic blood pressure ranged from 140-200 with mean value  $153.60 \pm 12.593$ . Diastolic blood pressure ranged from 100-130 with mean value  $92.60 \pm 6.285$ .

Our patients` laboratory investigations showed significant statistically increase in liver function test when compare baseline with follow up results .And decreased in platelets but Hb not changed like the study of (Susan, 2014).

Diagnosis of pre-eclampsia historically required high blood pressure and presence of protein in the urine, some definitions included the formal definition beside presence any organ dysfunction.

In this study, maternal management and monitoring of the studied group showed that 100% of patients admitted to hospital, 100% of patients had been measured blood pressure every 15-30 minute until BP less than 160/110 then 4 time / day, 100% of patients did investigation 3 time per week. In contrast that founded 100% of patients did dipstick test during admission but not daily, And (40%) of patients received corticosteroid within 7 day before termination.

Our study showed that Intravenous magnesium was given to 50% to women with Severe Preeclampsia in contrast with(Stacey M and Kathleen B, 2009) study that shown the importance of magnisumsulphate to prevent and treatment preeclampsia(Stacey M and Kathleen B, 2009).

This also found that about 69(46%) of patients did not use Dexamethasone for treatment HELLP syndrome, in contrast with the study by (Everett et al., 2017) that shown that antenatal dexamethasone is beneficial for preterm infants of women with HEELP, and postpartum corticosteroid treatment of HEELP syndrome patients result in more rapid correction of liver

enzyme and platelet counts and reduce maternal mortality(Everett et al., 2017). This study showed also about 100% had fetal assessment ultrasound every 2 weeks agree with this study by (Mohamed et al., 2018)that shown daily fetal movements count not done to any case, frequent fetal heart sound auscultation: this done to 98.1 % of cases, serial ultrasound examination (amniotic fluid index and femur length) all cases initially evaluated by U/S at the emergency unit to confirm fetal viability, assess AFI and gestational age, umbilical artery Doppler U/S done only to 9.8 % of cases, non-stress test (NST) was done to 39.2 % of cases but biophysical profile was not done to any case.

According to our study about termination of pregnancy, there was 30% of patients were terminated before 37 week ,And 70% of patients terminated at 37 week by initiating birth at 24/48 hour Susan Snyder(2014)The decision of termination of pregnancy was taken by 100% decision of senior obstetrician in presence of team of anesthesiologists and team of pediatricians.

Our study is consistent with finding by Gebreel 2018 that found the decision of delivery was taken when women were stable, BP control was achieved and appropriate senior personnel was present, even for fetal concerns and this was done to all cases. Mode of birth depended on fetal gestational age, fetal presentation, and cervical status, maternal and fetal condition: this done to 78.4 % of cases. Continuous electronic fetal monitoring for patient in labor: this was done to 100 % of cases. Attendance of pediatrician was in 51 % of cases (Mohamed et al., 2018).

Our study was shown that 60 % of patients admitted to ICU contrastly to the study by (Sreen T and Deborah M, 1994)which recommended that an intensive care unit (ICU) with standard facilities and off course optimal staffing strength must be established within the hospital maternity unit because eclampsia was the first obstetric diagnosis for ICU admission

(Sreen T and Deborah M, 1994),(Faponle A, &Adenekan A, 2012).

Postpartum management of our studied group showed that 42% Antihypertensive drug if BP >150/100 (Labetalol first, Nifedipine and IV hydralazine). And 58% of patients did not use labetalol as antihypertensive drug in contrast with the study by (Jorge et al., 2017)that showed that Oral nifedipine is faster than and at least as safe as labetalol in preeclampsia hypertensive emergency treatment.

Our study found that if investigation of the patients was not normal repeat until reach normal, And 64% of patients were measured blood pressure 4 time/day up to 2 week after birth, 46% of women with sever preeclampsia were followed by their GP specialist 6/8 weeks after birth, 100% of Patients were consented. That agrees with the study(Mohamed et al., 2018).

After delivery, the women remained on delivery suite for at least 8 hours, this done to all cases. The decision to transfer the patient to the ward was done by senior personnel. Follow up and continued antihypertensive drugs were done for all cases. Repetition of investigations until patients improved was done in 78.4 % of cases. Only 9.8 % of cases had stayed in hospital for 72 – 96 hours postnatal. Post-operative care fairly adherent to standard parameters but as regard to patient follow up weekly till 6 weeks post-delivery was not done to any patient

In our study shown that about 38% of patient was taken Aspirin 75-150 daily for 12 week until birth, contrastly the study of (Daniel L et al., 2017)that shown the intake of low-dose aspirin during pregnancy reduces the risk of preterm preeclampsia.

Limitations of the study were small sized sample size and retrospective nature of the study, this make our results in conclusive in determining our adherence to international guidelines in management. We hope in future, we will collect more data in prospective manner

**Strength of the study:** The strength of our study is the first to document the practice in south valley university hospitals for management of sever preeclampsia compared to international guidelines

### Conclusion

Most obstetricians reported pre-eclampsia and eclampsia are one of the major causes of maternal mortality. So the perfect management of these diseases can save many women lives.

Goals of our study are

- Learning doctors about symptoms, signs and complication of sever preeclampsia
- Patient with sever preeclampsia should be admit to hospital, do investigation 3 time per week.
- Measurement BP every 15-30 minute until BP less than 160/110 then 4 time / day.
- Reassessment the fetus every 2 week by ultrasound.
- Use the suitable antihypertensive drug as labetalol as first line, then nifedipine.
- Decision of termination of pregnancy involves senior obstetricians, team of pediatricians.and Team of anesthesiologist.
- Women with sever preeclampsia should admit to ICU. Intravenous sulphate should be taken.
- Offer woman with PET a medical review with their GP specialist 6/8 week after birth.
- This study addressed the gap between the actual management of pre-eclampsia at south valley Hospitals and the idealmanagement.
- Audit can be a useful tool to measure, improve and monitor the quality of day-to-day obstetric practice.

Clinical audit is not just a data collection exercise; it involves measuring current patient care and outcome against explicit audit criteria.

### Recommendation

- Continuous medical education for all staff in multidisciplinary team in the management of women with preeclampsia



the education must focus on the following :

1-Strict follow up of maternal and fetal condition

2- Proper management and follow up the women with high risk factor

• Raising the hospital facilities to improve the standard of care to women with sever preeclampsia by :

1- Increasing the number of ICU bed to accommodate all women with sever preeclampsia

2- Increasing the number of NICU bed to accommodate all preterm babies

3- Establishing of intermediate care

4- Establishing of special places for sever preeclampsia cases remote from othercase.

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