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Maternal, fetal and neonatal outcomes of severe preeclampsia in Mansoura University Hospitals: A prospective study

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Keywords

- Preeclampsia
- Maternal mortality
- Magnesium sulfate

Abstract

Background: Preeclampsia continues to affect 5% to 8% of all pregnancies throughout the world. It is a pregnancy-specific multisystem disorder and a leading cause of maternal and perinatal morbidity and mortality. The exact pathogenesis of preeclampsia remains poorly defined. Features of severe preeclampsia include severe proteinuria, hypertension, symptoms of central nervous system dysfunction, hepatocellular injury thrombocytopenia, oliguria, pulmonary edema, cerebrovascular accident, and IUGR. Women with severe preeclampsia must be hospitalized to try to stabilize the disease. **Aim of work**: To evaluate maternal, fetal and neonatal outcomes of severe preeclampsia in Mansoura university Hospitals. **Methods**: This was a prospective study for one year, from September 2019 till September 2020, included all gravid women with severe preeclampsia who were managed at Mansoura University hospitals, Department of Obstetrics and Gynecology. **Results**: This study included 204 patients. Regarding maternal outcomes, the percentages of Placental abruption, Acute renal failure, ICU admission, DIC, HELLP and PPH were 7.8%, 4.9%, 15.7%, 0.5%, 8.3% and 3.4%, respectively. Considering fetal outcomes, IUGR developed in 13% of cases, and 13% of cases ended with IUFD. With regard to neonatal outcomes, the percentages of preterm delivery, NICU admission low APGAR score were 69%, 62% and 47%, respectively. Gestational age was the only significant factor to affect incidence of IUFD, NICU admission and low APGAR score (P<0.001). **Conclusion**: Pre-eclampsia tends to threaten maternal health and fetal viability adding to maternal and neonatal mortality and morbidity. In addition, gestational age was the only significant factor to affect incidence of IUFD, NICU admission and low APGAR score.

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INTRODUCTION

Worldwide, preeclampsia is considered to be one of the major causes of maternal and perinatal morbidity and mortality. About 14% of maternal mortality is attributed to preeclampsia-eclampsia **[1]**. According to American College of Obstetricians and Gynecologists (ACOG) , preeclampsia is defined as; new-onset hypertension with a systolic blood pressure (SBP) of ≥140 mmHg or a diastolic blood pressure (DBP) of ≥90 mmHg on 2 occasions, at least 4 hours apart, after 20 weeks gestation, with or without proteinuria (≥300 mg per 24-hour urine collection, protein/creatinine ratio ≥0.3, or dipstick reading of 1+) **[2]**.

In the absence of proteinuria, severe preeclampsia is diagnosed in the presence of any of the following features: a) severe hypertension (a SBP of ≥160 mmHg or a DBP of ≥110 mmHg on 2 occasions, at least 4 hours apart), b) thrombocytopenia (platelet count of less than 100,000/μL), c) liver dysfunction (raised blood levels of liver transaminases to twice the upper normal levels), d) new onset renal insufficiency (raised serum creatinine level than 1.1 mg/dL or a doubling of serum creatinine in the absence of other renal disease), e) pulmonary edema, or f) new-onset neurological or visual disorders **[2]**.

Preeclampsia is a disorder with multisystem affection, where one or more factors are released throughout the maternal circulation resulting in damaging of the vascular endothelial cells. As a result, pregnant women suffering preeclampsia are at increased risk of developing dangerous complications, such as; disseminated intravascular coagulopathy (DIC), ante-partum hemorrhage, liver failure, acute renal failure, pulmonary edema, HELLP syndrome (hemolysis, elevated liver enzymes and low platelet count), eclampsia, retinal detachment, in addition to maternal mortality. Furthermore, preeclampsia has many fetal and neonatal complications, such as; preterm delivery, intrauterine growth restriction (IUGR) and still births **[3]**.

This study was done to determine maternal, fetal and neonatal outcomes of severe preeclampsia in Mansoura university Hospitals.

Patients and methods:

This study was a prospective cohort that took one year. It included gravid women with severe preeclampsia managed at Mansoura University hospitals, Department of Obstetrics and Gynecology during the period from September 2019 till September 2020.

Exclusion criteria included uncertain gestational age, fetal abnormalities, pre-existing renal disease, diabetes, asthma requiring steroidal treatment and chronic hepatitis.

We collected data about: maternal age, BMI, parity, gestational age at delivery, mode of delivery, major maternal complications as: DIC, HELLP syndrome, placental abruption, intensive care unit admission (ICU), acute renal failure and eclampsia. Moreover, incidence of IUGR and intrauterine fetal death (IUFD) was

recorded. Regarding neonatal outcomes, the following parameters were noticed mainly; Low Apgar score <7, preterm delivery, need for oxygen after delivery and neonatal intensive care unit (NICU) admission.

Statistical analysis and data interpretation:

Data were fed to the computer and analyzed using IBM SPSS Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Qualitative data were described using number and percent. Quantitative data were described using median for non-parametric data and mean, standard deviation for parametric data after testing normality using Kolmogrov-Smirnov test. Significance of the obtained results was judged at the (0.05) level.

Ethical consideration

An informed consent was taken from each patient included in the study after assuring confidentiality. Study protocol was approved by Institutional Review Board (IRB), Faculty of medicine, Mansoura University.

Results:

This study included 204 patients with mean age, BMI and gestational age at delivery of 28±7 years, 36±7 kg/m^2 and 34±4 weeks respectively, while the median gravidity and parity were 2 and 1 respectively. Cesarean section (CS) was demonstrated to be the commonest mode of delivery (76%) **(Tables 1 & 2)**. Regarding the clinical presentation of severe preeclampsia, headache was the most common presentation (57%), followed by vomiting (30%), then epigastric pain (22%), blurring of vision (21%), oliguria (9%) and generalized edema and ascites (2%) **(Table 3)**. Mean blood pressure readings and laboratory results are listed in **(Table 4)**.

Regarding maternal outcomes, the percentages of eclampsia, placental abruption, acute renal failure, ICU admission, DIC, HELLP syndrome, pulmonary edema and post partum hemorrhage (PPH) were 19.6%, 7.8%, 4.9%, 15.7%, 0.5%, 8.3% and 3.4% respectively **(Table 5).** With regard to fetal outcomes, the percentages of IUGR and IUFD were 13% each **(Table 6)**. In addition, neonatal outcomes revealed that the percentages of neonatal need for oxygen after delivery and NICU admission were 67% and 62% respectively. 69% of live born babies were delivered preterm. Moreover, APGAR score of less than 7 was present in 47% of babies **(Table 7)**. 87% of cases received magnesium sulphate (MgSO4). The mean Hospital stay and ICU stay duration were 7±4 and 3±1 days respectively **(Table 8)**. Gestational age was the only significant factor to affect incidence of IUFD, NICU admission and low APGAR score (P<0.001) **(Tables 9 & 10)**.

Table (1): Demographic characteristics among studied cases (n=204):

Maternal age/years	Mean±SD	28±7
BMI (kg/m2)	Mean±SD	36±7
Gestational age/weeks	Mean±SD	34±4

Table (2): Obstetric history of the studied cases (n=204):

Gravidity	median (range)	2 (1-14)
Parity	median (range)	1 (0-7)
Gravida	Primigravida Multigravida	88 (43%) 116 (57%)
Mode of delivery	Vaginal CS	50 (24%) 154(76%)

Table (3): Clinical presentation of the studied cases:

	N=204	**%**
Headache	117	57%
Vomiting	62	30%
Epigastric pain	45	22%
Blurring of vision	42	21%
Oliguria	19	9%
Generalized oedema and ascites	4	2%

Table (4): Mean blood pressure and laboratory findings of cases:

		Mean±SD
Systolic blood pressure	**(mmHg)**	165±14
Diastolic blood pressure	**(mmHg)**	100±8
Serum creatinine	**(mg/dl)**	0.9±0.5
SGOT	**(IU/L)**	56±82
SGPT	**(IU/L)**	47±70
HB	**(g/dl)**	11±1
Platelet	**($\times 10^3$/µL)**	179±70
proteinuria	**(+)**	3±1
Albumin	**(g/dl)**	3±0.5

Table (5): Maternal outcome distribution among studied cases:

	N=204	**%**
Eclampsia	40	19.6%
Placental abruption	16	7.8%
Acute renal failure	10	4.9%
ICU admission	32	15.7%
DIC	1	0.5%
HELLP	17	8.3%
Pulmonary oedema	0	0%
PPH	7	3.4%
Maternal mortality	0	0%

Table (6): Fetal outcome distribution among studied cases:

	N=204	**%**
Live birth	177	87%
IUGR	26	13%
IUFD	27	13%

Table (7): Neonatal outcome distribution among studied cases:

	N=177 live birth	%
Preterm	122	69%
Neonatal need for oxygen after delivery	119	67%
NICU admission	109	62%
APGAR score Mean± SD	7±2	
<7 **≥7**	84 93	47% 53%

Table (8): MgSO4 and hospital stay duration among studied cases:

	N=204	%
MgSO4	178	87%
Hospital stay/days Mean±SD	7±4	
ICU stay (Duration/days) Mean±SD	3± 1	

Table (9): Factors affecting incidence of IUFD and neonatal need for oxygen at delivery among studied cases:

Risk factors			**test of significance**	**neonatal need for oxygen at delivery**		**test of significance**
	Live birth	**IUFD**		**Not needed**	**needed**	
Maternal age/years Mean±SD	28±7	30±7	t=1.11 p=0.267	29±7	28±7	t=0.254 p=0.800
Gravidity Median (range)	2 (1-14)	2 (1-7)	Z=0.392 P=0.695	2 (1-9)	2 (1-14)	Z=0.303 p=0.762
Parity Median (range)	1 (0-7)	1 (0-6)	Z=0.275 P=0.784	1 (0-6)	1 (0-7)	Z=0.368 p=0.713
Gestational age/weeks Mean±SD	35±3	30±5	t=6.50 p<0.001*	35±4	33±3	t=4.74 p<0.001*
Eclampsia (%)	34 (19%)	6 (22%)	χ^2=0.135 p=0.713	20 (24%)	20(17%)	χ^2=1.42 p=0.233
Z: Mann Whitney U test, t:Student t test χ^2:Chi-Square test *statistically significant if p<0.05						

Table (10): Factors affecting incidence of NICU admission and low APGAR score among live born babies:

Risk factors	NICU		test of significance	APGAR score		test of significance
	not admitted	admitted		<7	>7	
Maternal age/years Mean±SD	29±7	28±7	t=0.321 p=0.748	28±7	29±7	t=1.01 p=0.315
Gravidity Median (range)	2 (1-9)	2 (1-14)	Z=0.059 p=0.953	2 (1-14)	2 (1-9)	z=0.029 p=0.977
Parity Median (range)	1 (0-7)	1 (0-6)	Z=.411 p=0.681	1 (0-6)	1 (0-7)	z=.541 p=0.589
Gestational age/weeks Mean±SD	36±4	33±3	t=6.41 p=0.001*	32±3	37±2	t=13.24 p<0.001*
Eclampsia (%)	22 (23%)	18 (17%)	$\chi 2$=1.42 p=0.233	13 (16%)	21 (23%)	X^2=1.44 p=0.231
Z: Mann Whitney U test, t:Student t test $\chi 2$:Chi-Square test *statistically significant if p<0.05						

Discussion:

The current study demonstrated that the mean age of the studied ladies was 28±7 years, the mean gestational age was 34±4 weeks and the median of their parity was 1. Similarly, **Ngwenya (2017)** reported comparable results with mean maternal age of 27.7±7.4 years, mean gestational age of 33.4±4.4 weeks gestation and average parity of 121 cases of 1±1 **[4]**.

In the present study, the mean BMI was 36±7 kg/m². A comparable mean of BMI (32.22 ± 6.55) for patients with severe preeclampsia was reported in a similar study, conducted in South Africa, by **Ngene and Moodley (2020) [5]**. In contrast, **Pramana et al. (2020)** demonstrated a lower BMI with an average of 30.89 kg/m², in their study conducted in Indonesia on cases with severe preeclampsia **[6]**. This difference may be related to racial factors.

The percentage of primigaravidas among studied cases was 43%. Comparable percentages were demonstrated in similar studies **[3, 5, 7, 8].** However, a lower percentage of 21.3% for primigravidas was reported in the study of **Pramana et al. (2020) [6].**

In terms of mode of delivery, CS was demonstrated to be the most common mode of delivery (76%). In the same line, **Dagdeviren et al. (2015) [9]** reported that a total of 77.1% of preeclamptic women underwent CS. Also, a comparable percentage of 78.5% for CS was reported by **Ngwenya (2017) [4]**. In contrast, other studies showed that vaginal route of delivery was more common than CS **[10, 3]**. But, the high CS rate reported in our study is in line with the most existing literature of increased rate of CS among patients with severe preeclampsia **[11].**

In terms of clinical presentation, headache was demonstrated to be the most common symptom (57%). In the same context, **Singhal et al. (2009)** reported that 44% of patients with severe preeclampsia had headache as the main presenting symptom **[12]**. Meanwhile, **Patnaik et al. (2019)** showed that among 120 cases with severe

preeclampsia, pedal edema was the main complaint (80.8%), followed by headache (40.8%) **[10]**.

With regard to maternal complications in our study, 19.6% of cases had eclampsia. This was in accordance with the study conducted by **Demir et al. (2006)** who demonstrated that among 144 cases with severe preeclampsia, 18% had eclampsia and 4.1% had eclampsia plus HELLP syndrome **[8]**. A comparable rate of 21.5% for eclampsia was reported in the study of **Ngwenya (2017) [4]**.

Regarding placental abruption, our study reported an incidence of 7.8%. This was in coordination with the study of **Priyanka and Sinha (2020)** which demonstrated that 7.85% of patients with severe preeclampsia had placental abruption **[1]**. On the other hand, a lower incidence of 2.5% for placental abruption was reported in the study of **Ngwenya (2017) [4]**.

The current study demonstrated that the percentages of cases with HELLP, DIC and Pulmonary edema were 8.3%, 0.5% and 0%, respectively. **Ngwenya (2017)** reported comparable percentages of 9.1%, 0.8% and 0.8% for the incidences of HELLP, DIC and Pulmonary edema, respectively **[4]**.

In contrast, higher incidences of DIC (13.57%) and Pulmonary edema (2.85%) were reported by **Priyanka and Sinha (2020) [1]**. This illustrates the proper antenatal care which the cases, included in our study, received, leading to more decrease in incidence of serious complications, such as DIC and pulmonary edema as compared to other similar studies.

Concerning renal insult associated with severe preeclampsia, our study reported a 4.9% incidence of acute renal failure among participants. In fact, a wide variation of incidence of acute renal failure among preeclamptic patients has been reported in literature, from 1.7% up to 16.76% **[1, 3, 4, 13, 14]**. These variations in percentages of renal dysfunction can be attributed to co-morbidities associated with preeclampsia.

Concerning PPH, our study revealed an incidence of 3.4%. This was in good agreement with the study of **Ndoni et al. (2016)** that reported an incidence of 3.9% for severe PPH among cases with severe preeclampsia **[15]**. Similarly, a more or less approaching incidence of 5.8% was reported by **Patnaik et al. (2019) [10]**.

Noteworthy, despite the serious nature of severe preeclampsia, no maternal mortality was reported in the present study. Similarly, no maternal mortalities were observed in similar studies, in rich-resourced countries, such as Kuwait and United Kingdom **[16, 17]**. In contrast, maternal mortalities among cases with severe preeclampsia were reported in other studies, with an incidence of about 1.66% up to 7.14% **[1, 4, 8, 10]**.

Regarding ICU admission, the present study displayed that 15.7% of cases were admitted to ICU. In contrast, **Patnaik et al., (2019)** reported that 4.16% of cases with severe preeclampsia were admitted to ICU **[10]**. This difference can be explained by the more incidences of acute renal failure (4.9% VS 0.83%) and HELLP (8.3% VS 0.83%) in the present study.

Concerning fetal outcomes, the current study showed that the incidence of IUFD was 13%. An approaching incidence was reported in similar studies **[3, 8]**.

Concerning IUGR, our study revealed an incidence of 13%. In the same context, a higher incidence of 20% was reported by **Patnaik et al. (2019) [10]**.

This may be attributed to other co-morbidities associated with severe preeclampsia.

The current study demonstrated the incidence of NICU admission was 62% (109/177), and that 47 % of live born babies had APGAR score of less than 7. In the same context, **Priyanka and Sinha (2020)** reported a percentage of 78.30% for NICU admission, whereas, **Ngwenya (2017)** reported a percentage of 54.5% **[1, 4]**.

On the other hand, **Patnaik et al., (2019) [10]** reported that 26.6% of neonates were admitted to NICU and 23.3% of neonates had APGAR score of less than 7. These differences in percentages may be related to different degrees of respiratory distress that neonates had developed, as well as gestational age at time of delivery.

Regarding preterm delivery, the current study showed that 69% of live born babies were preterm; born before 37 completed weeks of gestation. More or less similar incidences of 68.57% and 70% were reported by **Priyanka and Sinha (2020)** and **Patnaik et al. (2019)**, respectively **[1, 10]**.

Lastly, being a single center study and collecting data over a period of one year are the major limitations of the present study. Therefore, further multicenter studies should be conducted over distinctive years in order to highlight maternal, fetal and neonatal outcomes of severe preeclampsia over a larger scale.

Conclusion:

Pre-eclampsia tends to threaten maternal health and fetal viability adding to maternal and neonatal mortality and morbidity. In addition, gestational age was the only significant factor to affect incidence of IUFD, NICU admission and low APGAR score.

References:

1. **Priyanka, R., & Sinha, C. (2020 June).** Maternal and perinatal outcome in severe preeclampsia and eclampsia. JMSCR, 8(6), 242-245.
2. **ACOG. (2013 Nov).** Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy. Obstet Gynecol, 122(5), 1122-1131.
3. **Saxena, N., Bava, A.K., & Nandanwar, Y. (2016 Jul).** Maternal and perinatal outcome in severe preeclampsia and eclampsia. Int J Reprod Contracept Obstet Gynecol, 5(7), 2171-2176.
4. **Ngwenya, S. (2017)**. Severe preeclampsia and eclampsia: incidence, complications, and perinatal outcomes at a low-resource setting, Mpilo Central Hospital, Bulawayo, Zimbabwe. International Journal of Women's Health, 9, 353–357.
5. **Ngene, N.C., & Moodley, J. (2020)**. Pre-eclampsia with severe features: management of antihypertensive therapy in the postpartum period. Pan African Medical Journal, 36(216).
6. **Pramana, C., Peranawengrum, K.B., Juliani, V., et al (2020)**. Maternal Characteristics and Perinatal Outcomes in Women with Severe Preeclampsia. Sys Rev Pharm, 11(11), 549-553.
7. **Drakeley, A., Roure, P.A., Anthony, J., et al (2002).** Acute renal failure complicating severe preeclampsia requiring admission to an obstetric intensive care unit. Am J Obstet Gynecol, 186(2), 253-256.
8. **Demir, S.C., Evruke, C., Ozgunen, F.T., et al (2006).** Factors that influence morbidity and mortality in severe preeclampsia, eclampsia and

hemolysis, elevated liver enzymes, and low platelet count syndrome. Saudi medical journal, 27(7), 1015.

9. **Dagdeviren, H., Çankaya, A., Cengiz, H., et al (2015)**. Maternal and neonatal outcomes of women with preeclampsia and eclampsia at a tertiary care center. Haseki Tip Bulteni, 53(2).
10. **Patnaik, U.S., Devi, G.R., Anusha, K., et al (2019).** Maternal and perinatal outcome in severe pre-eclampsia. IAIM, 6(10), 43-49.
11. **Alonso-Ventura, V., Li, Y., Pasupuleti, V., et al (2020).** Effects of preeclampsia and eclampsia on maternal metabolic and biochemical outcomes in later life: A systematic review and meta-analysis. Metabolism: Clinical and Experimental, 102, p. 154012.
12. **Singhal, S., Deepika, Anusha, et al (2009).** Maternal and perinatal outcome in severe preeclampsia and eclampsia. South Asian Federation of Obstetrics and Gynaecology, 1(3), 25-28.
13. **Conti-Ramsden, F.I., Nathan, H.L., De Greeff, A., et al (2019).** Pregnancy-related acute kidney injury in preeclampsia: risk factors and renal outcomes. Hypertension, 74(5), 1144-1151.
14. **Mulik, J., & Gaikwad, V. (2018)**. Acute renal failure in preeclampsia and eclampsia. Int J Reprod Contracept Obstet Gynecol, 7(12), 5097-5101.
15. **Ndoni, E., Hoxhallari, R., & Bimbashi, A. (2016 Mar)**. Maternal Complications in Severe Preeclampsia in a University Hospital in Tirana. Macedonian Journal of Medical Sciences, 15; 4(1), 102-106.
16. **Chibber, R., Al-Hijji, J., Amen, A., et al (2016).** Maternal and perinatal outcome of eclampsia over a decade at a tertiary hospital in Kuwait. J Matern Fetal Neonatal Med, 29(19), 3132–3137.
17. **Tuffnell, D.J., Jankowicz, D., Lindow, S.W., et al (2005).** Yorkshire Obstetric Critical Care Group. Outcomes of severe preeclampsia/eclampsia in Yorkshire 1999/2003. BJOG, 112(7), 875–880.