

## A Study on Role of Neutrophil to Lymphocyte Ratio as Predictor of Pre Eclampsia

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### Abstract

**Aims:** To evaluate the relationship of Neutrophil to Lymphocyte ratio in pregnant women with Preeclampsia and to investigate whether Neutrophil to Lymphocyte ratio has a role in predicting preeclampsia.

**Patients and methods:** This study was conducted in Niloufer hospital, mother and child health care unit, Osmania medical college Hyderabad from August 2016 to August 2017. This case-control study was conducted on 108 healthy pregnant women and 108 pregnant women with pre-eclampsia. Among 216 cases and controls 16 women were excluded based on exclusion criteria.

**Results:** The median NLR value of the preeclampsia group was significantly higher than that of the control group [ $7.39 \pm 3.51$  vs.  $3.20 \pm 1.08$ ;  $p < 0.001$ ].

**Conclusion:** Given that this study has shown the neutrophil to lymphocyte ratio is increased in women who has preeclampsia, this may serve as a predictor for the disease. In antenatal follow-up, we think that the measurement of NLR periodically may be useful to predict high-risk pregnancies in terms of preeclampsia.

**Key words:** Neutrophil to Lymphocyte ratio, preeclampsia, pregnant women

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### NEED FOR STUDY-

Incidence of hypertensive disorder complicating pregnancy is 10- 14%. (1). They contribute to mortality as high as 30% in India. Hence establishing cost-effective bio-markers help in early prediction of disease which in turn helps in early treatment and slow down progression of disease.

### I. Introduction

Preeclampsia is one of the major health problems during pregnancy. Identifying those women who develop Hypertension during pregnancy is one of the preventive strategies in obstetrics to reduce maternal as well as fetal mortality and morbidity. Many theories have been postulated for the cause of Preeclampsia but no exact theory has been established. One of the theories is inflammatory changes and oxidative stress (2 & 3).

However, information related to leukocyte count and its differentials is limited in patients with preeclampsia. Based on these conflicting data, the current study was conducted in order to compare neutrophil to lymphocyte ratio (NLR) in pregnant women with or without preeclampsia and to investigate whether NLR has a role in predicting pre-eclampsia

### II. Patients and Methods

This study was conducted in Niloufer hospital, mother and child health care unit, Osmania medical college Hyderabad from August 2016 to August 2017. This case-control study was conducted on 108 healthy pregnant women and 108 pregnant women with pre-eclampsia. Among 216 cases and controls 16 women were excluded based on exclusion criteria. Cases comprised of 100 women with hypertension complicating pregnancy full filling the inclusion criteria. 100 normotensive women were taken as controls. All the women gave informed consent to participate in the study and it was approved by institutional ethical committee.

### CRITERIA FOR SELECTION OF PATIENTS

#### INCLUSION CRITERIA-

- Normal pregnant women 28-40wks of GA
- Pregnant women with Pre-eclampsia between 28-40wks of GA were recruited

The definitions used for Preeclampsia in this study are those of "ACOG 2014 guidelines of hypertension in pregnancy (1)

**Exclusion criteria:**

- Patients with history of membrane rupture
- Patients with history of any infection
- Patients with Multiple pregnancies were excluded
- presence of fetal anomalies and maternal or fetal infection,
- pregestational or gestational diabetes mellitus,
- Pregnant women with cardiovascular disease, and renal or liver diseases.
- Pregnant women in labour.

Statistical analysis of qualitative and quantitative data was made and p value derived by using chi square test

**PROCEDURE**

All the patients satisfying the above criteria were selected for the study. The tests were carried out in hospitalized patients and pregnant women attending antenatal OP. Gestational age was determined using last menstrual period and was confirmed by early and late Ultra sound Scans. A detailed history was taken, general physical and systemic examination including the obstetric examination. Per speculum examinations were done to look for any evidence of vaginal infection clinically. Blood pressure was recorded by using Sphygmomanometer. Peripheral venous blood samples were taken. Total and differential leukocyte counts were measured by an automated hematology analyzer along with full blood count. Neutrophil & Lymphocyte levels were measured and Neutrophil to Lymphocyte ratio in the obtained blood samples were determined.

**Observations**

The demographic data of the patients was recorded. Age , BMI , Parity, Gestational age of both controls and cases were comparable

**Table 1:** shows The demographic and clinical data in study groups :

Variables	Preeclampsia Group	Control Group	P value
Age in years	27.60 ± 6.47	26.98 ± 6.33	0.502
Parity	0.87 ± 1.04	1.07 ± 1.09	0.194
BMI (kg/m <sup>2</sup> )	24.1 ± 3.6	23.5 ± 2.5	0.23
Period of Gestation (In Weeks)	35.3 ± 2.6	37.9 ± 1.3	0.0003
Systolic BP, mm Hg	156.44 ± 13.8	108.16 ± 11.15	<0.001
Diastolic BP, mm Hg	101.39 ± 9.73	67.54 ± 7.55	<0.001

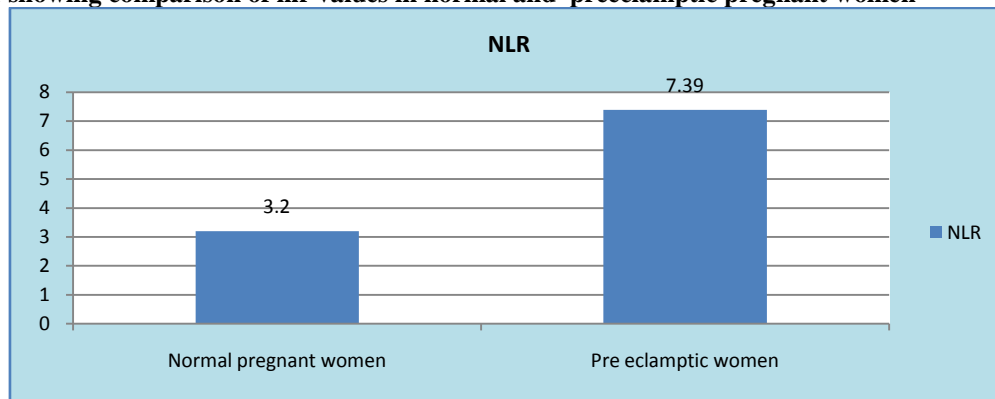
**The above table shows that the difference in both systolic blood pressure and diastolic blood pressure in cases and controls is statistically significant ( P< 0.001)**

This study compares the difference in commonly tested haematological parameters undertaken in the normal pregnant women and pregnant women with pre-eclampsia. Statistical comparison was made between the control group and Preeclampsia patients in respect to Neutrophil to Lymphocyte ratio and other parameters.

**Table 2:** shows Full Blood Count comparison

Variables	Preeclampsia	Normal pregnant	P value
Haemoglobin	11.46 ± 1.30	11.09 ± 1.22	0.172
White blood cell (10 <sup>3</sup> per ml)	13.34 ± 3.39	9.76±2.01	0.051
Neutrophils (10 <sup>3</sup> per ml)	11.01 ± 3.28	6.80±1.80	0.025
Lymphocyte (10 <sup>3</sup> per ml)	1.65 ± 0.45	2.23±0.51	0.04
NLR	7.39 ± 3.51	3.20±1.08	0.001
	Abbreviations: FBC:	Full blood count	

Figure 1 showing comparison of nlr values in normal and preeclamptic pregnant women



### III. Results and analysis

The mean systolic blood pressure in cases was  $156.44 \pm 13.8$  mm of Hg while that of controls was  $108.16 \pm 11.15$  mm of Hg. The difference is statistically significant (P Value < 0.001). Similarly, the diastolic BP in cases was  $101.39 \pm 9.73$  mm of Hg while that in controls was  $67.54 \pm 7.55$  mm of Hg, the difference being statistically significant ( P Value < 0.001).

The Hemoglobin level was  $11.46 \pm 1.30$  gms/dl, WBC count, Neutrophil count, Lymphocyte count were  $13.34 \pm 3.39$ ,  $11.01 \pm 3.28$ ,  $1.65 \pm 0.45$  respectively in the cases group. The hemoglobin was  $11.09 \pm 1.22$  gms/dl, WBC count , Neutrophil count, Lymphocyte count were  $9.76 \pm 2.01$ ,  $6.80 \pm 1.80$ ,  $2.23 \pm 0.51$  respectively in control group. There was no significant difference between the cases and control group. NLR was  $7.39 \pm 3.51$  in the PE group and  $3.20 \pm 1.08$  in the normotensive group. Analysis showed that there is a statistical difference between the cases and control groups( P Value < 0.001)

### IV. Discussion

Hypertension is most common medical disorder complicating pregnancy. The etiopathogenesis is multi factorial and inflammation is considered to play a key role in causing Pre-eclampsia. In the present study, a total of 200 subjects were studied, out of which 100 were normotensive healthy pregnant women and 100 were hypertensive pregnant women. There is a statistically significant difference in Blood Pressure between the two groups. (P < 0.001). Comparing the hematological parameters between the cases and controls (Table – 2) , it is observed that the Hemoglobin levels and WBC counts were not statistically different between the groups. This finding is consistent with findings of Mehmet et al (2017) ( P - 0.214)

Table – 3 Comparison of NLR of cases Pre-eclampsia group in the present study with other studies

Studies	nlr in pre eclampsia	Nlr in normal pregnant women	P value
Present study n=200	$4.8 \pm 3.2$	$2.947 \pm 0.463$	<0.001
Prasmusinto et al [2017]n=254(4)	$14.91 \pm 8.16$	$2.61 \pm 2.3$	<0.001
Gezer et al[2016] n=430(5)	$3.8 \pm 1.5$	$2.9 \pm 0.5$	<0.001
Kortugulu et al 2014 n=203(6)	$14.48 \pm 7.8$	$2.8 \pm 1.3$	<0.023
Serin et al[2016]n=107(7)	$5.2 \pm 4.3$	$3.9 \pm 2.3$	<0.010
Yilmaz et al[2014] n=160(8)	$6.3 \pm 3.5$	$3.7 \pm 1$	<0.05
Olylum et al 2013 n=306(9)	$7.3 \pm 3.5$	$3.1 \pm 1.1$	<0.001
Mehmet topas et al[2017] n=187(10)	$6.8 \pm 3.9$	$7.2 \pm 3.7$	0.7

There is a significant increase in the neutrophil to Lymphocyte ratio in the cases group (P Value < 0.010) which is similar to the findings of Serin et al (2016) and other workers (P value < 0.010) Gezer et al (2016), Kortugulu et al (2014), Yilmaz et al(2014) and others.

Physiologic anemia, neutrophilia, mild thrombocytopenia, increased procoagulant factors, and diminished fibrinolysis are considered normal during pregnancy. It has been hypothesized that circulating syncytiotrophoblast debris contributes to maternal inflammation. Neutrophilia which suggests inflammation begins to occur after 8 weeks and stabilizes in the second trimester.

But in Pre-eclampsia it is seen that the activation of physiological inflammatory pathway that happens in normal pregnancy is exaggerated

It evolved from work presented in this study, that women who had pre-eclampsia have statistically significant NLR.

The neutrophil/lymphocyte ratio (NLR) has been proposed as a new indicator of systemic inflammation. Its predictive and prognostic value has been demonstrated in several cardiovascular diseases also [11,12,13]. To date, there have been several studies about predictive markers and prognostic factors of preeclampsia, but, unfortunately only a few have been found to be significant.

## V. Conclusion

Full Blood Counts are routinely performed in pregnant women at the beginning of their pregnancy. the test is relatively cheap and as they are done before 16 weeks of gestation (that is, before placentation is completed), NLR can be measured. Given that this study has shown that neutrophil to lymphocyte ratio is increased in women who have Pre-eclampsia, this may serve as a predictor for the disease. In antenatal follow-up, we think that the measurement of NLR periodically may be useful to predict high-risk pregnancies in terms of preeclampsia.

However, large scale prospective studies are needed to determine the optimal NLR value and its prognostic significance in the diagnosis of preeclampsia.

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