Section: OBG

Original Research Article

RED CELL DISTRIBUTION WIDTH IN ASSESSING PRESENCE, SEVERITY AND OUTCOME OF PRE-ECLAMPSIA-A CASE CONTROL STUDY

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Received *: 28/01/2025*
Received in revised form *: 01/04/2025*
Accepted *: 17/04/2025*

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DOI: 10.70034/ijmedph.2025.2.116

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 644-650

ABSTRACT

Background: To compare RDW between pre-eclampsia and uncomplicated pregnancy and to compare RDW between severe and non-severe pre-eclampsia.
Materials and Methods: This was a Case control study was conducted in Karnataka Institute of Medical Sciences, Hubballi for 18months between November 2019 to April 2021.100 non severe pre-eclampsia and 100 severe pre-eclampsia cases were taken and compared with 100 healthy controls. Pre-eclampsia classified as severe and non-severe according to NICE guidelines. Sociodemographic characteristics, obstetric and clinical data were recorded.
Results: In this study in both cases and control group most of them belonged to the age group 19-24years with mean age of 24.5 years. On comparing the gestational age preterm was more in pre-eclampsia group (42.5%) compared to control group (19%) with p-value of <0.001 and in pre-eclampsia group pre-term deliveries was significantly increased in sever PE patients. There was no difference in the mean haemoglobin, mean MCV, mean MCH and mean HCT between severe PE and non-severe PE patients. There was significant increase in the mean RDW-CV, RDW-SD and MCV between severe PE patients compared to nonsevere PE patients.
Conclusion: In conclusion, complete blood count test which is including RDW, is an easy, inexpensive, routinely reported investigation, which might help in diagnosing the severity of the disease and predicting the development of complication in preeclampsia patients. However, results of our study should be confirmed by multicentre studies including larger number of cases.
Keywords: Pre-eclampsia, severity, red cell distribution width, blood indices.

INTRODUCTION

Hypertension, the most common medical complication during pregnancy, occurs in approximately 5-10 percent of all pregnancies and together they are one member of the deadly triad – along with haemorrhage and infection – that contributes greatly to maternal morbidity and mortality, perinatal mortality and morbidity.
Pre-eclampsia is a multisystem disorder specific to pregnancy and puerperium, which manifests by onset of hypertension and proteinuria after 20weeks of gestation and resolves by 12weeks post-partum.[1]

The relationship between RDW and preeclampsia can be explained by several possible mechanisms. Increased inflammatory response is the most probable underlying mechanism. Previous studies have reported that preeclampsia was associated with increased tumor necrosis factor and interleukin levels 2 while also revealing a close relationship between RDW levels and increased inflammation.[3] Inflammation likely increases RDW levels via impairment of iron metabolism, disruption of response to erythropoietin, and shortening of the lives of red blood cells.[4]
Red Cell Distribution Width (RDW) estimates the degree of heterogeneity of the erythrocyte volume. Normal range is between (11.5-14.5).[5] It is evaluated in a fully automated haematology analyser as a part of Complete Blood Count (CBC) and has a high sensitivity in the differential diagnosis of anaemia.

Therefore, the current study was undertaken to study the relationship between RDW and pre-eclampsia in Indian population and to investigate if it can be used as a severity marker.

MATERIALS AND METHODS

This was a Case control study was conducted in Karnataka Institute of Medical Sciences, Hubballi for 18months between November 2019 to April 2021.100 non severe pre-eclampsia and 100 severe pre-eclampsia cases were taken and compared with 100 healthy controls. Pre-eclampsia classified as severe and non-severe according to NICE guidelines. Sociodemographic characteristics, obstetric and clinical data were recorded. The complete blood count, including RDW, was measured using an automated hematology analyzer.

Inclusion Criteria

1. All women admitted to the antenatal ward and labour room diagnosed as PREECLAMPSIA according to NICE guidelines during index pregnancy.
2. Women with uncomplicated pregnancy as controls.

Exclusion Criteria

1. Patients with Haemoglobin <10gm%
2. Patients with GDM, hepato-renal disorders
3. Patients with chronic inflammatory diseases
4. Patients with malignancy

Statistical Analysis

Data will be entered into Microsoft excel data sheet and will be analyzed using SPSS 22 version software. Categorical data will be represented in the form of Frequencies and proportions. Chi-square will be the test of significance. Continuous data will be represented as mean and standard deviation. Independent t test will be the test of significance to identify the mean difference between two groups. p value <0.05 was considered as statistically significant.

RESULTS

Table 1: Comparison of age distribution of the participants between Pre-eclampsia and healthy controls

Age categories	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
19-24 years	123 (61.5%)	65 (65.0%)	188 (62.7%)	0.3
25-29 years	37 (18.5%)	17 (17.0%)	54 (18.0%)	
30-34 years	34 (17.0%)	18 (18.0%)	52 (17.3%)	
35-38 years	6 (3.0%)	0 (0.0%)	6 (2.0%)	
Mean (SD) age, in years		24.5 (4.4)		0.3

Majority of the pregnant women in our study in both pre-eclampsia group (61.5%) and control group (65%) belonged to 19-24yrs age group. Mean age in both the group is 24.5yrs. 58% of the women in non-severe pre-eclampsia and 65% of the women in sevre preeclampsia group were aged between 19-24yrs. There is no significant difference in the mean age between non-severe PE and severe PE group.

Table 2: Comparison of Obstetric index between pre-eclampsia patients and healthy controls

Characteristics	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
Gravida				
1	98 (49.0%)	40 (40.0%)	138 (20.0%)	
2	47 (23.5%)	34 (34.0%)	81 (27.0%)	
3	31 (15.5%)	18 (18.0%)	49 (16.3%)	
4	24 (12.0%)	8 (8.0%)	32 (10.7%)	
Parity				
Para 1	28 (14.0%)	35 (35.0%)	63 (21.0%)	
Para 2	43 (21.5%)	13 (13.0%)	56 (18.7%)	
Para 3 and above	2 (1.0%)	5 (5.0%)	7 (2.3%)	
Abortions				
No abortion	146 (73.0%)	81 (81.0%)	227 (75.6%)	0.06
1 abortion	40 (20.0%)	18 (18.0%)	58 (19.3%)	
2 or more abortion	14 (7.0%)	1 (1.0%)	15 (5.0%)	

Primigravida are slightly more in number in pre-eclampsia group (49%), no significant difference was seen with parity and abortion history. Previous history of abortions (previous one abortion 20% in PE group and 18% in control group, previous two abortion 7% in PE group and 1% in control group) were more in preeclampsia group compared to control group but it is not statistically significant.

Table 3: Comparison of gestational age distribution of the participants between Preeclampsia and healthy controls

Gestational age categories	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
Less than 34 weeks	29 (14.5%)	3 (3.0%)	32 (10.6%)	0.000
34 – 37 weeks	56 (28.0%)	16 (16.0%)	72 (24.0%)	
More than 37 weeks	115 (57.5%)	81 (81.0%)	196 (65.3%)	

There was significant increase in pre-term (less than 37 weeks) deliveries in preeclampsia group compared to control group. 32.5% of pregnant women in preeclampsia group and 19% in control group were delivered before <37 weeks. Preterm deliveries <37wks (including both <34wks and between 34-37wks) are more among severe pre-eclampsia (50%) group compared to non-severe pre-eclampsia (35%) group. That is there is significant increase in pre-term deliveries in severe PE patients compared to non-severe PE patients.

Table 4: Comparison of Risk factors distribution of the participants between Preeclampsia and healthy controls

Risk factors	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
Breech	16 (8.0%)	4 (4.0%)	20 (6.6%)	0.699
Previous LSCS	41 (20.5%)	11 (11.0%)	52 (17.3%)	<0.001
FGR	17 (8.5%)	2 (2.0%)	19 (6.3%)	
PROM	9 (4.5%)	12 (12.0%)	21 (7.0%)	-
Oligohydramnios	12 (6.0%)	5 (5.0%)	17 (5.7%)	-
Placenta Praevia	0	1 (1.0%)	1 (0.3%)	-
Hypothyroidism	1 (0.5%)	4 (4.0%)	5 (1.6%)	-
IUD	10 (5.0%)	0	10 (3.3%)	-

Breech presentation, previous history of LSC, FGR, oligohydramnios, IUD were more common in pre-eclampsia group compared to control group. PROM and hypothyroid cases were more in control group. But not statistically significant.

Table 5: Comparison of the distribution of type of Labour among the participants between Pre-eclampsia and healthy controls

Characteristics	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
Type of Labour				
Induced	87 (43.5%)	27 (27.0%)	114 (38.0%)	<0.000
Previous LSCS	41 (20.5%)	6 (6.0%)	47 (15.7%)	
Spontaneous	72 (36.0%)	67 (67.0%)	139 (46.3%)	

43.5% of the women in pre-eclampsia group labour was induced; while only 27% of labour was induced in control group. Spontaneous onset of labour was more (67%) in control group.

Table 6: Comparison of the blood parameters - haemoglobin, RDW, MCH, MCV and HCT distribution of the participants between Pre-eclampsia and healthy controls

Mean (SD)	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	p-value
Haemoglobin (g/dL)	11.6 (0.8)	13.1 (9.9)	12.1 (5.8)	0.038
RDW – SD	53.3 (7.9)	41.2 (4.0)	49.2 (8.9)	<0.000
RDW – CV	15.7 (1.3)	13.1 (1.3)	14.8 (1.8)	<0.000
MCV	88.6 (4.1)	87.3 (5.0)	88.2 (4.5)	0.019
MCH	30.5 (2.2)	29.7 (2.6)	30.2 (2.4)	0.003
HCT	41.7 (4.2)	29.9 (1.8)	37.8 (6.6)	<0.000

There is no significant variation in the mean Hb, MCV in pre-eclampsia group (11.6gm%) and control group (13.1gm%). RDW-SD, RDW-CV are significantly raised in pre-eclampsia group compared to control group. Mean RDW-SD is 53.3 in pre-eclampsia group and 41.2 in control group. Mean RDW-CV is 15.7 in preeclampsia group and 13.1 in control group.

Table 7: Comparison of the distribution of complications between Pre-eclampsia and healthy controls

Complications	Preeclampsia (n=200)	Healthy controls (n=100)	Total (n=300)	P value
Abruption	5 (2.5%)	0	5 (1.6%)	
Chronic Hypertension	1 (0.5%)	0	1 (0.3%)	
Imminent Eclampsia	12 (6.0%)	0	12 (4.0%)	
Post-partum Eclampsia	5 (2.5%)	0	5 (1.6%)	

Ante-partum Eclampsia	6 (3.0%)	0	6 (2.0%)	
Post-partum haemorrhage	7 (3.5%)	3 (3.0%)	10 (3.3%)	
Pulmonary Oedema	1 (0.5%)	0	1 (0.3%)	
PPCM	6 (3.0%)	0	6 (2.0%)	
Intra-uterine Death	7 (3.5%)	0	7 (2.3%)	

In control group there was no complication of abruption, chronic hypertension, imminent symptoms, post-partum and ante-partum eclampsia, IUD, PPCM and pulmonary oedema. No significant difference seen in incidence of post-partum haemorrhage between pre-eclampsia group and control group. There was slight increase in LSCS rate in pre-eclampsia group (33%) compared to control group (25%) but it is not statistically significant. Vaginal delivery rate was 75% in control group and 67% among pre-eclampsia group.

Table 8: Comparison of Obstetric index between Severe Pre-eclampsia patients and Non severe pre-eclampsia

Gravida	Severe Preeclampsia (n=100)	Non severe pre-eclampsia (n=100)	Total (n=200)	p-value
Gravida 1	47 (47.0%)	51 (51.0%)	98 (49.0%)	0.177
Gravida 2	22 (22.0%)	25 (25.0%)	47 (23.5%)	
Gravida 3	21 (21.0%)	10 (10.0%)	31 (15.5%)	
Gravida >= 4	10 (10.0%)	14 (14.0%)	24 (12.0%)	

Most of the pregnant women were primigravida in both the group that is 47% of the non-severe PE and 51% of the severe PE cases were primigravida. There was no significant difference between the obstetric score between non-severe and severe preeclampsia group.

Table 9: Comparison of Risk factors distribution of the participants between Severe Pre-eclampsia and Non severe pre-eclampsia

Risk factors	Severe Preeclampsia (n=100)	Non severe pre-eclampsia (n=100)	Total (n=200)	p-value
Breech	10 (10.0%)	6 (6.0%)	16 (8.0%)	0.903
Previous LSCS	23 (23.0%)	19 (19.0%)	42 (21.0%)	
FGR	11 (11.0%)	6 (6.0%)	17 (8.5%)	
IUD	6 (6.0%)	3 (3.0%)	9 (4.5%)	
Oligohydramnios	7 (7.0%)	5 (5.0%)	12 (6.0%)	
PROM	4 (4.0%)	5 (5.0%)	9 (4.5%)	

Incidence of Breech presentation, previous history of LSCS, FGR, IUD, oligohydramnios, PROM was more in Severe PE group compared to non-severe PE group but it is not statistically significant. Maximum Induction of labour was done in 50% of the pregnant women with severe pre-eclampsia group compared to non-severe pre-eclampsia (37%). There was statistically significant increase in incidence of LSCS in severe PE patients (23%) compared to non-severe PE patients (18%).

Table 10: Comparison of the blood parameters - haemoglobin, RDW, MCH, MCV and HCT distribution of the participants between Severe PE and Non severe PE group

Mean (SD)	Severe PE (n=100)	Non severe PE (n=100)	Total (n=200)	p-value
Haemoglobin (g/dL)	11.62 (0.81)	11.68 (0.95)	11.65 (0.88)	0.622
RDW – SD	55.64 (7.33)	51.97 (8.39)	53.31 (7.97%)	0.017
RDW – CV	16.35 (1.28)	15.16 (1.02)	15.76 (1.30)	<0.000
MCV	89.4 (3.6)	87.8 (4.5)	88.6 (4.1)	0.005
MCH	30.8 (2.1)	30.3 (2.3)	30.5 (2.2)	0.119
HCT	41.9 (4.1)	41.6 (4.3)	41.8 (4.2)	0.705

There is no difference in the mean haemoglobin, mean MCH and mean HCT between severe PE and non-severe PE patients. There is significant increase in the mean
RDW-CV, RDW-SD and MCV between severe PE patients compared to non-severe PE patients. Mean RDW-CV, RDW-SD, MCV in severe PE group is 16.35, 55.64 and
89.4 respectively and in non-severe PE group it is 15.16, 51.97, 87.8 respectively.
Incidence of Abruption, development of imminent symptoms, post-partum and antepartum eclampsia,

PPCM, chronic hypertension pulmonary oedema and IUD all were significantly increased in severe PE group compared to non-severe PE group.

DISCUSSION

Pre-eclampsia is associated with adverse maternal and fetal outcome. Timely diagnosis, treatment and assessment of pre-eclampsia is necessary to prevent adverse maternal and fetal outcome. Our study deals with assessing the presence and severity of pre-eclampsia by means of red cell distribution width.

There was no significant difference in the mean age between pre-eclampsia group and control group in all the studies.[6,7,8] Mean age group in our study is 24.2 in preeclampsia group an 24.5 in control group.

There was no significant difference in the mean age between non-severe preeclampsia group and severe pre-eclampsia group in all the studies.[6,7,8] Mean age group in our study is 25.0 in non-severe pre-eclampsia group an 24.2 in severe preeclampsia group.

Mean diastolic BP in our study in pre-eclampsia group is 100.5mmHg which is similar to Yılmaz ZV et al,[6] (101.39) and M. M. Elgari et al,[9] (104.7). There was a significant difference in DBP in pre-eclampsia and control group in all the studies.

Mean diastolic BP in non-severe pre-eclampsia group in our study is 96mmHg which is similar to Yılmaz ZV et al,[7] (97.2). Mean systolic BP in non-severe pre-eclampsia group in our study is 105mmHg which is similar to Yılmaz ZV et al7 (107.6). There was a significant difference in DBP in non-severe pre-eclampsia and severe preeclampsia group in all the studies.

In our study Mean systolic BP in pre-eclampsia group is 150.5mmHg which is similar to Yılmaz ZV et al,[6] (156.4) and M. M. Elgari et al,[9] (104.7) and Mean SBP in control group is 107.1 which is similar to Yılmaz ZV et al,[6] (108.16). There was a significant difference in DBP in pre-eclampsia and control group in all the studies.

Mean systolic BP in non-severe pre-eclampsia group in our study is 142mmHg which is similar to Yılmaz ZV et al6 (97.2). Mean systolic BP in severe pre-eclampsia group in our study is 159mmHg which is similar to Burak Yücel et al,[10] (160), Kurt et al,[7] (159) and Yılmaz ZV et al,[6] (166.1). There was a significant difference in SBP in nonsevere pre-eclampsia and severe pre-eclampsia group in all the studies. In our study Mean haemoglobin in pre-eclampsia group is 11.6 which is similar to Yılmaz ZV et al,[6] (11.46), M. M. Elgari et al,[9] (11.9), abdhllahi et al,[8] (11.4).

Control group it is 13.9. There is no significant difference between haemoglobin between pre-eclampsia group and control group.

Table 32: Comparison of haemoglobin in non severe pre-eclampsia and severe preeclampsia

Study	Year	Non severe PE	Severe PE	p-value
Yılmaz ZV et al[7]	(2016)	11.58±1.30	11.32±1.34	0.818
Kurt et al[8]	(2015)	10.5 ± 1.3	10.2 ± 1.3	0.415
Abdhllahi et al	(2014)	10.4 (1.3)	10.7 (1.5)	0.760
Our study	(2020)	11.68 (0.95)	11.62 (0.81)	0.622

Mean haemoglobin in non-severe pre-eclampsia group in our study is 11.68; which is similar to Yılmaz ZV et al,[7] (11.58). Mean haemoglobin in severe pre-eclampsia group in our study is 11.32 which is similar to Yılmaz ZV et al,[7] (11.32). There was no significant difference in haemoglobin in non-severe pre-eclampsia and severe preeclampsia group in all the studies.

Table 33: Comparison of MCV in pre-eclampsia and control group

Study	Year	Pre -eclampsia	Control	p-value
M. M. Elgari et al[12]	(2018)	86 ± 6.2	83 ± 8.1	<0.01
Avcıoğlu et al[10]	(2018)	80.42±7.86	83.88±2.31	0.003
Our study	(2020)	88.6 (4.1)	87.3 (5.0)	0.019

In our study Mean MCV in pre-eclampsia group is 88.6 which is similar to M. M. Elgari et al,[12] (86) and Mean MCV in control group is 87.3. MCV was significantly raised in pre-eclampsia when compared to control group in our study and M. M.

Table 34: Comparison of MCV in non severe pre-eclampsia and severe pre-eclampsia

Study	Year	Non severe PE	Severe PE	p-value
Avcıoğlu et al[10]	(2015)	82.16±7.43	78.81±7.91	0.03
Our study	(2020)	87.8 (4.5)	89.4 (3.6)	0.005

Mean MCV in non-severe pre-eclampsia group in our study is 87.8, in Avcıoğlu et al,[10] (82.16). Mean MCV in severe pre-eclampsia group in our study is 89.4, in Avcıoğlu et al,[10] (78.81). MCV was on higher side in severe PE group compared to non-severe PE group; while according to Avcıoğlu et al,[10] non-severe PE group showed elevated MCV compared to severe PE group.

Table 35: Comparison of MCH in pre-eclampsia and control group

Study	Year	Pre eclampsia	Control	p-value
M. M. Elgari et al[12]	(2018)	29 ± 2.7	26 ± 3.3	<0.01
Our study	(2020)	30.5 (2.2)	29.7 (2.6)	0.119

In our study Mean MCH in pre-eclampsia group is 30.5 which is similar to M. M. Elgari et al,[12] (29 ± 2). There was a significant increase in mean MCH in preeclampsia group according to M. M. Elgari et al.[12] in our study we did not find any significant difference in mean MCH between pre-eclampsia and control group.

Table 36: Comparison of HCT in pre-eclampsia and control group

Study	Year	Pre -eclampsia	Control	p-value
Yılmaz ZV et al[7]	(2016)	33.30±4.04	34.32±3.01	0.970
M. M. Elgari et al[12]	(2018)	35 ± 3.9	33 ± 4.9	<0.01
Our study	(2020)	41.7 (4.2)	29.9 (1.8)	0.000

In our study Mean systolic BP in pre-eclampsia group is 150.5mmHg which is similar to Yılmaz ZV et al,[7] (156.4) and M. M. Elgari et al,[12] (104.7) and Mean SBP in control group is 107.1 which is similar to Yılmaz ZV et al,[7] (108.16). There was a significant difference in DBP in pre-eclampsia and control group in all the studies.

Table 37: Comparison of HCT in non-severe pre-eclampsia and severe pre-eclampsia

Study	Year	Non severe PE	Severe PE	p-value
Yılmaz ZV et al[7]	(2016)	35.12±4.28	34.02±3.90	0.225
Our study	(2020)	41.6 (4.3)	41.9 (4.1)	0.705

Mean HCT in non-severe pre-eclampsia group in our study is 41.6; Yılmaz ZV et al,[7] (35.12). Mean HCT in severe pre-eclampsia group in our study is 41.9, Yılmaz ZV et al,[7] (34.02). There was no significant difference in HCT in non-severe pre-eclampsia and severe pre-eclampsia group in both the studies.

Table 38: Comparison of mean RDW in pre-eclampsia group and control group

Study	Year	Pre -eclampsia	Control	p-value
Yılmaz ZV et al[7]	(2016)	15.23±1.96	14.48±1.70	0.021
M. M. Elgari et al[12]	(2018)	15 ± 2.3	14 ± 2.0	<0.01
Kurt et al[8]	(2015)	16.9 ± 1.7	14.1 ± 1.1	<0.01
Ishag Adam et al[9]	(2019)	15.10 ± 2.48	14.26 ± 1.71	<0.001
Avcıoğlu et al[10]		15 (13.8-16.57)	13.9 (13-15.6)	<0.01
Abdhllahi et al[11]	(2014)	14.5 ± 1.8	14.4 ± 1.4	0.710
Burak Yücel et al[59]	(2016)	13.59 (11.06-22.24)	13.80 (11.39-21.39)	0.037
Our study	(2020)	15.7 (1.3)	13.1 (1.3)	0.000

In our study Mean RDW-CV in pre-eclampsia group is 15.7 (1.3), Yılmaz ZV et al,[7] (15.23) and M. M. Elgari et al,[12] (15), Kurt et al,[8] (16.9), Ishag Adam et al,[9] (15.10), Avcıoğlu et al,[10] (15), Abdhllahi et al,[11] (14.5), Burak Yücel et al59 (13.59) and Mean RDW-CV in control group is 14.48 , Zehra et al (14.48), M. M. Elgari et al,[12] (14), Kurt et al,[8] (14.1), Ishag Adam et al9 (14.26), Avcıoğlu et al,[10] (13.9), Abdhllahi et al,[11] (14.4), Burak Yücel et al,[59] (13.80). There was a significant rise in RDW-CV in preeclampsia and control group in all the studies except Abdhllahi et al,[11]and Burak Yücel et al,[59]

Table 39: Comparison of RDW in non severe pre-eclampsia and severe preeclampsia

Study	Year	Non severe preeclampsia	Severe PE	p-value
Yılmaz ZV et al[7]	(2016)	15.08±2.07	15.92±1.99	0.030
Kurt et al[8]	(2015)	16.4 + 1.5	18 + 1.5	<.001
Burak Yücel et al[59]	(2016)	13.59 (11.06-22.24)	14.78 (11.13-20.53)	0.360
Ishag Adam et al[9]	(2019)	14.037 ± 1.07	15.10 ± 0.85	<.001
Avcıoğlu et al[10]		15.4(13.9-17.45)	14.3(13.7-15.7)	0.031
Abdhllahi et al[11]	(2014)	14.7 ± 1.9	13.9 ± 1.4	0.144
Our study	(2020)	15.16 (1.02)	16.35 (1.28)	0.000

Mean haemoglobin in non-severe pre-eclampsia group in our study is 15,[16] Yılmaz ZV et al,[7] (15.08), Kurt et al,[8] (15.08), Ishag Adam et al,[9] (14.037), Avcıoğlu et al,[10] (15.4), Abdhllahi et al11 (14.7), Burak Yücel et al,[59] (13.59) Mean RDW-CV in severe pre-eclampsia group in our study Is 16.35 which is similar to Yılmaz ZV et al,[7] (15.92), Kurt et al,[8] (18), Ishag Adam et al,[9]

(15.10), Avcıoğlu et al,[10] (14.3), Abdhllahi et al,[11](13.9), Burak Yücel et al59 (14.78). There was significant increase in RDW-CV in severe pre-eclampsia compared to non-severe pre-eclampsia group in all the studies
except Abdhllahi et al,[11] and Burak Yücel et al.[59]

CONCLUSION

In conclusion, complete blood count test which is including RDW, is an easy, inexpensive, routinely reported investigation which is raised in pre-eclampsia patients due to increased inflammatory process which might help in diagnosing the severity of the disease. We also found that development of complications was more in patients with raised RDW. Thus we also can predict the complications in patients with higher RDW. However, results of our study should be confirmed by multicentre studies including larger number of cases.

Limitation of the study

- It is a single centre study
- Most of the pre-eclampsia cases were associated with anaemia so those cases were not included in study as anaemia is also associated with increased red cell distribution width.
- GDM, overt diabeties mellitus other inflammatory conditions are also associated with increased RDW so those cases are excluded from our study.
- No long term follow up of cases in term of reduction in red cell distribution width.

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