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2003 8

.



2003 6 20



:

: 1999 1 2002 9

72

49

가

42

가 7

:

가

가

가

:

가

가 .



: , ,

	-----	1
	-----	3
	-----	4
I.	-----	5
II.	-----	7
A.	-----	7
B.	-----	7
1.	-----	7
2.	-----	8
3.	-----	8
4.	-----	8
III.	-----	14
IV.	-----	16
V.	-----	22
	-----	23
	-----	29



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velocity ----- 13

# I.

5-10%

1

가

가

,<sup>2</sup> 1977 Fitzgerald가

3

(end-diastolic velocity)

가 (absence of end-diastolic velocity :

AEDV) (reversed end-diastolic velocity : REVD) 가

, 7 Apgar score,

가 ,<sup>4-6</sup>

7,8

가

가

(nucleated red blood cell)

.<sup>9</sup>

,<sup>10, 11</sup>

,<sup>12</sup>      <sup>13</sup>

가

<sup>14</sup>

erythropoietin

가

가    가

.<sup>15</sup> Phelan <sup>16</sup>, Korst

<sup>17</sup>

가

가

가

,

가

가

가

.

**II.**

**A.**

1999 1 2002 9  
72 49  
27 , , 가 .  
20 160 mmHg  
110 mmHg 24  
500mg 6 2  
++ .

(fetal growth restriction: FGR)

10%

HELLP(Hemolysis, Elevated liver enzyme, Low platelet)

**B.**

1.

3

가 AEDV , 가 PEDV  
Ultramark 9(Advanced

Technology Laboratories, Bothell, Wash.)

2.

100

3.

score , 1 5 Apgar

4.

SPSS 10.0 Student's t-test,  $\chi^2$  test  
Fisher exact test P value 0.05

**Table 1.** Patient characteristics according to umbilical artery Doppler velocity

	PEDV (n=42)	AEDV (n=7)	P value
Maternal age (yr) (mean± SD)	28 ± 4.5	33 ± 5.7	<0.05*
Primiparity	22 (52.4%)	2 (28.6%)	NS
Multiparity	20 (47.6%)	5 (71.4%)	NS
Past Hx	4 (9.5%)	1 (14.3%)	NS

PEVD: present end diastolic velocity, AEDV: absent end diastolic velocity

NS: not significant

Past history: previous pregnancy history of preeclampsia, FGR

Student's t-test,  $\chi^2$  – test

**Table 2.** Perinatal outcome according to umbilical artery Doppler velocity

	PEDV (n=42)	AEDV (n=7)	P value
GA at delivery (wks) (mean± SD)	34 ± 3.8	33 ± 2.82	NS
Preterm delivery (<37wks)	28 (67%)	6 (85.7%)	NS
Birth weight (gm) (± SD)	2235.71 ± 724.63	1381.42 ± 461.96	<0.05*
Cesarean section	22 (52.4%)	6 (85.7%)	NS
Fetal distress	9 (21.4%)	6 (85.7%)	<0.05*
Meconium staining	5 (11.9%)	1 (14.3%)	NS
1 min Apgar score <7	12 (28.6%)	4 (57.1%)	NS
5 min Apgar score <7	4 (9.5%)	1 (14.3%)	NS
Admission to NICU	23 (54.8%)	7 (100%)	<0.05*
Perinatal death	2 (4.8%)	0 (0%)	NS
FGR	12 (28.6%)	3 (42.9%)	NS

NICU : neonatal intensive care unit, FGR: fetal growth restriction

Student' s t-test,  $\chi^2$  – test

**Table 3.** Neonatal morbidity according to umbilical artery Doppler velocity

	PEDV (n=42)	AEDV (n=7)	P value
Hospital day (days) (mean± SD)	10.21 ± 16.10	38.57 ± 20.48	<0.05*
Assisted ventilation	4 (9.5%)	4 (57.1%)	<0.05*
Respiratory distress	6 (14.3%)	3 (42.9%)	NS
Sepsis/DIC	9 (21.4%)	2 (28.6%)	NS
Intracranial hemorrhage	5 (11.9%)	4 (57.1%)	<0.05*
Cardiovascular disease	3 (7.1%)	1 (14.3%)	NS
Jaundice	1 (2.4%)	0 (0%)	NS
Electrolyte imbalance	2 (4.8%)	1 (14.3%)	NS
Necrotizing enterocolitis	1 (2.4%)	1 (14.3%)	NS
Seizure	1 (2.4%)	0 (0%)	NS
Pneumonia	3 (7.1%)	2 (28.6%)	NS
Bronchopulmonary dysplasia	1 (2.4%)	2 (28.6%)	NS
Developmental delay	1 (2.4%)	0 (0%)	NS
Retinopathy of prematurity	5 (11.9%)	3 (42.9%)	NS

DIC : disseminated intravascular coagulopathy

Student' s t-test,  $\chi^2$  – test



**Table 4.** Neonatal morbidity delivered before 37 weeks of gestation in relation to the results of umbilical artery Doppler velocity

	PEDV ( n=28)	AEDV (n=6)	P value
Assisted ventilation			
( GA at delivery)			
27-31	3/9	2/2	NS
32-36	1/19	1/4	NS
Intracranial hemorrhage			
(GA at delivery)			
27-31	1/9	2/2	<0.05*
32-36	4/19	2/4	NS
Hospital day			
( GA at delivery)			
27-31	24.6 ± 22.6	54 ± 12.7	NS
32-36	10.6 ± 13.6	32.5± 23.7	<0.05 *

Fisher exact test

**Table 5.** Umbilical artery blood cell count according to umbilical artery Doppler velocity

	PEDV (n=42)	AEDV (n=7)	P value
nRBC (mean± SD)	4.06 ± 0.50	4.30± 0.52	NS
Hemoglobin (mg/dl)	14.35 ± 2.48	15.82 ± 0.47	<0.05*
Hematocrit (%)	42.40 ± 9.23	49.51± 2.77	<0.05*
Platelet (x1000)	212.73 ± 82.64	163.71 ± 46.07	NS

Student' s t-test

### III.

49 PEDV 42 (83.3%), AEDV 7  
(16.7%) . AEDV 33 ± 5.7

가 (Table 1).

가 AEDV

1, 5, 7 Apgar (Table 2).

AEDV가 가 PEDV

(Table 3).

31, 32-36

27-31

27-

32-

36

(Table 4).

PEDV

2

27

750, 800gm

10 14

가

AEDV

(Table 5).

IV.

5-10%

!

가

2가

18-20

가

8

18

AEDV

.<sup>21</sup>

24

가

가

가 가

/

(S/D

)

30

3.0

.<sup>21</sup>

Christiane

<sup>22</sup>

S/D 가

(loop)

가

가

가

가

<sup>22</sup>  
 (pulsatile index: PI) 가 ,  
 20 , ,  
<sup>23</sup>  
 가 Trudinger  
<sup>24</sup> 2,178 AEDV 31  
 , 81% , 68% 7 Apgar 86%  
 , 7 Apgar ,  
 (pH<7.2) 가  
<sup>2,21,25,26</sup> AEDV 16.6%  
 , AEDV  
 , Apgar  
 가 .  
 AEDV ,  
 , 가 <sup>27</sup> McDonnell  
 가 <sup>28</sup>

가 , ,  
가 .  
,  
27-31  
32-36  
. 가  
가 .  
가  
가 ,  
, <sup>9-11</sup> 가  
. 100 10 2,000 nRBCs/mm<sup>3</sup> 가  
<sup>29,30</sup> ( pH < 7.0 base deficit > 12  
mEq/L) 가 , <sup>31</sup> 가 가 가  
가 . 가  
가 48-72 , 101  
가 가  
가 가 (2,497/mm<sup>3</sup> : 7,960/mm<sup>3</sup>)  
가 0-11,476/mm<sup>3</sup>

.<sup>32</sup> Saracoglu <sup>33</sup>

가 , 가

38-39

7.56, 가 11.18, 가 24.43

100 14

cut-off( 87%, 81%) .

, ,

3.4/12/48.6

Korst 가

.<sup>17</sup> 가 34

Moser 30-31

26.6, 40.94

.<sup>34</sup>

가 .<sup>35</sup>

가 Berstein

36

가

33 52

가 135.5

가 17.4

, ,

가,

.

Philip<sup>9</sup>, Soothill<sup>37</sup>



가 . Salafia 465

.<sup>38</sup>

,

가

,

가

가

가

<sup>39</sup>

가

가

.<sup>40,41</sup>

가

가

가가

.<sup>40,41</sup>

가

가

.<sup>42</sup>

2.4

5.2

,

2

4.4, 4.2

가

AEDV PEDV

가

가  
가

**V.**

가 .

가 .

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- ABSTRACT -

Umbilical Nucleated Red Blood Cell Counts and Perinatal Outcome According to  
Doppler End-diastolic Velocity in Severe Preeclampsia

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**Purpose** : To assess the umbilical nucleated red blood cell counts and perinatal outcomes according to umbilical artery Doppler end diastolic velocity in severe preeclampsia.

**Material and Method** : A prospective case-control study comparing 42 severe preeclampsia patients who had present umbilical artery end diastolic velocity with 7 severe preeclampsia patients who absent end diastolic velocity for umbilical nucleated red blood cell counts and perinatal outcomes.

**Result** : Those with absent end diastolic velocity did not have significantly greater nucleated red blood cell counts, but they had increased hemoglobin, hematocrit. These newborn had significantly lower birth weight, increased Cesarean section rate

for fetal distress and been more frequently admitted to the neonatal intensive care unit. These newborn also had significantly increased intracranial hemorrhage, assisted ventilation and longer hospital days.

**Conclusion** : No correlation with nucleated red blood cell counts and chronic fetal hypoxia were presented. However further study with more expanded cases for the role of nucleated red blood cell counts as a marker of fetal hypoxia will be needed.

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*Key words* : Nucleated red blood cell counts, Doppler end diastolic velocity,

Preeclampsia