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PREDICTION OF PREECLAMPSIA BY WAIST CIRCUMFERENCE AND BY MEAN ARTERIAL PRESSURE

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Abstract

Introduction: The early detection of the risk of PE may improve the outcome by increasing patient surveillance or by initiating a therapeutic intervention. After taking family history and medical history of obstetric events, hypertension, renal disease, or thrombophilia can help to stratify the risk of hypertensive disorders of pregnancy and history alone will identify fewer than half the women who later develop pre-eclampsia. Routine screening for specific risk factors for pre-eclampsia i.e. nullipara, older age, high body mass index (BMI), family history of pre-eclampsia, multiple pregnancy, more than 10 years between pregnancies, and a personal history of pre-eclampsia is advised.

Material and Methods: Detail history of all the participants was taken which comprises of age, parity, and past obstetric complications. Medical history was taken and pregnant ladies. Blood pressure measurement was done by standard mercury sphygmomanometer. Mean arterial pressure was calculated by Burton's formula. Waist circumference was measured midway between the lowest rib and the iliac crest. Waist circumference of >80 cm was used as a cut off.

Results: Majority of the patients who developed pre eclampsia were in the age group of 20 to 25 years (66%).in our study primigravida were 60% who developed pre eclampsia. In our study 40 (20%) had mean arterial pressure >90 mmHg 22 developed preeclampsia while out of 160 (80%) patients having mean arterial pressure <90 mmHg 24 developed preeclampsia. sensitivity, specificity, positive predictive value and negative predictive value was 47.83 %, 88.31 %, 55.00% and 85.00 % respectively.86 women had waist circumference >80 cm out of 80 women 34 developed preeclampsia while 52 were normotensive. Out of 114 women having waist circumference <80 cm 12 developed preeclampsia while 102 remain normotensive with sensitivity, specificity, positive predictive value and negative predictive value of 73.91%, 66.23%, 39.53% and 89.47% respectively.

Conclusion: Mean arterial pressure is a good predictor of preeclampsia with high specificity and negative predictive value. Waist circumference is a simple and reproducible method with high negative predictive value.

Introduction:

Preeclampsia is one of the major cause of maternal and perinatal morbidity and mortality[i,ii].Preeclampsia (PE) can be subdivided into early onset PE, requiring delivery before 34 weeks' gestation and late onset PE, with delivery at or after 34 weeks[iii].PE affects about 2 % of pregnant ladies, is thought to be the consequence of impaired trophoblastic invasion of the maternal spiral arteries and their conversion from narrow vessels to wide non-muscular channels[iv]. The early detection of the risk of PEmay improve the outcome by increasing patient surveillance or by initiating a therapeutic intervention[v].

After taking family history and medical history of obstetric events, hypertension, renal disease, or thrombophilia can help to stratify the risk of hypertensive disorders of pregnancy and history alone will identify fewer than half the women who later develop pre-eclampsia[vi]. Routine screening for specific risk factors for pre-eclampsia i.e. nullipara, older age, high body mass index (BMI), family history of pre-eclampsia, multiple pregnancy, more than 10 years between pregnancies, and a personal history of pre-eclampsia is advised[vii].Doppler ultrasonography of the uterine arteries at 20- 24 weeks gestation, to detect abnormal trophoblast invasion, predicts about 40% of preeclampsia[viii].

This study was undertaken to evaluate the association of mean arterial pressure and antenatal waist circumference in early detection of preeclampsia.

Material and Methods

This study was carried out in the Dept. of Obstetrics and Gynaecology in Vedanta Institute of Medical

Sciences Dahanu, Palghar, Maharashtra. Written informed consent was obtained from all the participants.

Detail history of all the participants was taken which comprises of age, parity, and past obstetric complications. Medical history was taken and pregnant ladies with diabetes, chronic nephritis, essential hypertension, recent history of steroid use and collagen vascular diseases were excluded from the study. Blood pressure measurement was done by standard mercury sphygmomanometer with patient sitting for at least 2-3 minutes with arm kept on table so that arm and heart were nearly at the same level. After resting for 5 to 10 min, blood pressure was measured in both arms, and a series of recordings were made at 5-min intervals for three times. Mean arterial pressure was calculated by Burton's formula i.e Mean arterial pressure = Diastolicblood pressure + 1/3rd pulse pressure. Mean arterial pressure >90 mm hg was taken as abnormal. Gestational age was calculated from last menstrual period (LMP) and confirmed by first trimester ultrasound where LMP was not known

Waist circumference was measured midway between the lowest rib and the iliac crest. Waist circumference of >80 cm was used as a cut off.

A total of 200 women were included in the study. Data was entered in Microsoft excel sheet version 2013 Data were analysed by using SPSS software version 19. The sensitivity, specificity, and positive predictive values and likelihood ratios for cut-offs in the prediction of adverse pregnancy outcomes were calculated.

Results

A total of 200 pregnant ladies who fulfilled the criteria were included in the study.

Majority of the patients who developed pre eclampsia were in the age group of 20 to 25 years (66%).in our study primigravida were 60% who developed pre eclampsia

Table 1: Prediction of preeclampsia by Mean arterial pressure

Mean arterial pressure (mm of Hg)	Preeclampsia	Normotensive	Total
>90 mmHg	22 (a)	18 (c)	40
< 90 mmHg	24 (b)	136 (d)	160
Total	46	154	200

Statistics	formula	Value	95% CI
Sensitivity	$\frac{a}{a+b}$	47.83%	32.89% to 63.05%
Specificity	$\frac{d}{c+d}$	88.31 %	82.16% to 92.92%
Positive Likelihood Ratio	$\frac{Sensitivity}{1-Specificity}$	4.09	2.41 to 6.94
Negative Likelihood Ratio	$\frac{1-Sensitivity}{Specificity}$	0.59	0.45 to 0.78
Disease prevalence	$\frac{a+b}{a+b+c+d}$	23.00% (*)	17.36% to 29.46%
Positive Predictive Value	$\frac{a}{a+c}$	55.00% (*)	41.87% to 67.47%
Negative Predictive Value	$\frac{d}{b+d}$	85.00 % (*)	81.03% to 88.26%
Accuracy	$\frac{a+d}{a+b+c+d}$	79.00% (*)	72.69% to 84.43%

In our study 40 (20%) had mean arterial pressure >90 mmHg 22 developed preeclampsia while out of 160 (80%) patients having mean arterial pressure <90 mmHg 24 developed preeclampsia. sensitivity, specificity, positive predictive value and negative predictive value was 47.83 %, 88.31 %, 55.00% and 85.00 % respectively.

Table 2: Prediction of preeclampsia by Waist circumference

Waist circumference	Preeclampsia	Normotensive	Total
>80 cm	34 (a)	52 (c)	86
<80 cm	12 (b)	102 (d)	114
Total	46	154	200

Statistic	Formula	Value	95% CI
Sensitivity	$\frac{a}{a+b}$	73.91%	58.87% to 85.73%
Specificity	$\frac{d}{c+d}$	66.23 %	58.18% to 73.65%
Positive Likelihood Ratio	$\frac{Sensitivity}{1-Specificity}$	2.19	1.65 to 2.90
Negative Likelihood Ratio	$\frac{1-Sensitivity}{Specificity}$	0.39	0.24 to 0.65
Disease prevalence	$\frac{a+b}{a+b+c+d}$	23.00% (*)	17.36% to 29.46%
Positive Predictive Value	$\frac{a}{a+c}$	39.53% (*)	33.07% to 46.38%
negative Predictive Value	$\frac{d}{b+d}$	89.47 % (*)	83.76% to 93.34%
Accuracy	$\frac{a+d}{a+b+c+d}$	68.00% (*)	61.05% to 74.40%

In our study86 women had waist circumference >80 cm out of 80 women 34 developed preeclampsia while 52 were normotensive. Out of 114 women having waist circumference <80 cm 12 developed pre-eclampsia while 102 remain normotensive with sensitivity, specificity, positive predictive value and negative predictive value of 73.91%, 66.23%, 39.53% and 89.47% respectively.

DISCUSSION

Several guidelines has been issued on routine antenatal care recommending that, at the first visit, a woman's level of risk for pre eclampsia, based on factors in her history, should be determined and women at high-risk are advised to take low-dose aspirin daily from early pregnancy until the birth of the baby[ix].

It has been shown that maternal demographic characteristics, like medical and obstetric history are potentially useful in screening for pre eclampsia[x].

In a meta-analysis it was shown that mid-trimester mean arterial pressure was the best predictor of pre-eclampsia in low risk women[xi]. In our study predictive strength of mean arterial pressure was moderate, the positive and negative likelihood ratios of a second trimester mean arterial pressure of ≥ 90 mm Hg were 4.09 and 0.59. In our study. 46 women who developed preeclampsia 22(47.8%) had mean arterial pressure more than 90 mm of Hg whereas out of 154 normotensive women only 24 (11.68%) had mean arterial pressure more than 90 mm of Hg and 136(88.31%) had mean arterial pressure with sensitivity of 47.83% and specificity of 88.31%. similar results were shown by Page EW et al in their study showing low sensitivity of 43% and high specificity of 87%[xii].

In our study out of 46 women who developed preeclampsia 34(73.91%) had waist circumference >80 cms while out of 154 normotensive women only 52(33.76%) had waist circumference >80 cms and 102(66.23%) women had waist circumference < 80 cms. with sensitivity, specificity, positive predictive value and negative predictive value of 73.91%, 66.23%, 39.53% and 89.47% respectively. Quass et al[xiii]. showed65% sensitivity and 88% specificity, while Pehlan et al[xiv] showed 20% sensitivity and 95% specificity. Page et al showed sensitivity and specificity as 43% and 87% respectively[12].

CONCLUSION

In our study it was concluded that mean arterial pressure is a good predictor of preeclampsia with

high specificity and negative predictive value. Waist circumference is a simple, and reproducible method with high negative predictive value.

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