Establishment of reference Resistive Index values of preeclampsia and gestational hypertension using Doppler ultrasound

Chitumba Last
National University of Science and Technology

Introduction

A lot of research has been done to find out how umbilical artery resistive index is affected by hypertensive disorders of pregnancy with gestational age, however use of Doppler ultrasound scan has not been adopted as a tool to diagnose preeclampsia and gestational hypertension in most parts of the world. In Zimbabwe no research has been done to date to determine how umbilical artery resistive index vary with gestational age for patients with preeclampsia and gestational hypertension. There are no reference resistive index (RI) values for black Zimbabwean woman despite known variations across populations.

WHO (2008) clinically define preeclampsia (PE) as de novo hypertension (>140/90 mmHg) appearing after 20 weeks of gestation accompanied by proteinuria defined as 300 mg of protein or more in a 24 hour urine collection which correlates with a spot ratio of 30 mg/ml. This is the local standard currently in use to diagnose and differentiate preeclampsia from gestational hypertension and in most countries around the world .WHO define Gestational Hypertension as elevated blood pressure(>140/90 mmHg) without significant proteinuria.

Variation of umbilical artery RI with gestation in patients with hypertension

Mason et al ,1993 claimed that the Doppler RI indexes of the umbilical arteries in women with gestational hypertension are higher than in healthy pregnant women,this finding is suggestive of increased downstream vascular resistance.Contrary to this others like Levine (1992) have found no differences in the Doppler RI values of the umbilical arteries between normotensive and woman with gestational hypertension.

Methods

Research Design
The research design is a non-interventional, descriptive and comparative study. The study was prospective in nature as patients were followed over a period of time during their obstetric visits with other records obtained from previous antenatal visits.The population of the study comprised of obstetric patients referred to United Bulawayo Hospital from 18 to 44 years.

Measurement of the foetal umbilical resistive index (RI)
The umbilical cord was investigated using colour Doppler and Doppler signals were recorded from the free-floating part of the umbilical artery as close to the placenta as possible. Measurement of RI values was done when the foetus was inactive and while the mother held her breath. Before making the measurement the signal was recorded for at least five to eight cycles of waveforms of equal shape and amplitude. One wave form was selected and the RI measured manually using electronic calliper. The first calliper was placed on the systolic peak and the second on the lowest part of the diastole trough.Blood pressure and urine protein was measured clinically.

Results

RI values tend to increase with advancing gestational age for patients with preeclampsia. The RI readings ranged from 0.70 to 0.90 exhibiting a mean of 0.7869 and a median value of 0.78. This sample was analysed for a 95% confidence interval. RI values also tend to increase with advancing gestational age for patients with Gestational Hypertension; however the mean and median values are comparatively lower across the gestational age .The RI readings for participants with gestational hypertension ranged from 0.60 to 0.76 exhibiting a mean of 0.67 and a median of 0.67.

Figure 4.7

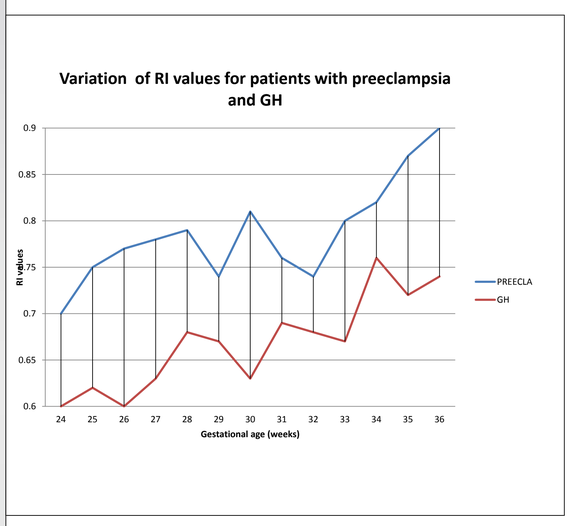
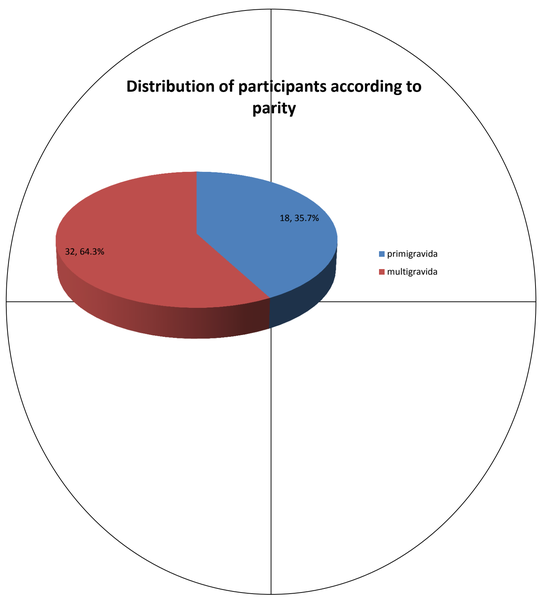


Figure 4.2



Conclusions

- There is a range of RI values for preeclampsia and gestational hypertension that tend to increase with gestational age.
- There are distinct RI values for preeclampsia and gestational hypertension across the gestational spectrum, with RI values for preeclampsia higher than those for gestational hypertension.

Bibliography

1.Levine AB, Lockwood CJ, Chitkara U, Berkowitz RL. 1992. Maternal renal artery Doppler velocimetry in normotensive pregnancies.

2.Mason GC, Lilford RJ, Proter J, et al. Randmised. 1993 comparison of routine versus highly selective use of doppler ultrasound in low risk pregnancies.