

Uterine Artery Velocimetry at Mid-Gestation for Prediction of Recurrent Pre-Eclampsia

**Thesis
Submitted for partial fulfillment**

Of

M.Sc Degree in Gynaecology & Obstetrics

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Introduction

Pregnancy induced Hypertension (PIH), is a syndrome of hypertension and proteinuria, it is a unique hypertensive disorder to human pregnancy. It complicates 5-7 % of all pregnant women and it is the most common cause of maternal and foetal morbidity and mortality (**Cunningham et al., 2001**).

Preeclampsia has been called “a disease of the theories” illustrating the fact that the etiology of preeclampsia remains largely unexplained. Placental ischemia Theory: Ischaemia could inflict the endothelial cell dysfunction. These lead to poor placental perfusion and placental ischemia, resulting in release of many factors that are capable of acting on peripheral sites around the body leading to a cascade of events, making preeclampsia a multi-system disorder syndrome. (**Ledger, William L., 2004**)

Much research has been done to identify unique screening tests that would predict the risk of developing preeclampsia before the classic symptoms appear and to distinguish preeclampsia from other hypertensive disorders. The reason for early screening for preeclampsia is to try to identify high-risk pregnancies allowing modification of antenatal care in this group and to allow preventive treatment regimens. (**Ledger, William L., 2004**)

Increased uterine artery vascular impedance in pregnancies complicated by preeclampsia increases the likelihood of recurrence and growth restriction during the next pregnancy. (**Gudnasson, Haraldur M. Dubiel, Mariusz. Gudmundsson, Saemundur, 2004**)

Abnormal uterine artery waveform is superior to maternal serum hCG for identification of placental pathology leading to preterm delivery, low birth weight, and preeclampsia in high-risk pregnant patients. (**HersHKovitz, Reli. de Swiet, Michael. Kingdom, John, 2005**)

Doppler evaluation of the uterine artery at mid gestation represents a useful predictive test for pre-eclampsia and adverse pregnancy outcome in High risk pregnancy and can be used in prenatal surveillance of a low risk population (**Caforio et al., 1999**).

Aim of the work

To determine whether uterine artery Doppler done at mid gestation can be used a predictor for the recurrence of PIH.

Materials and Methods

A longitudinal prospective study will be conducted at Ain shams Maternity Hospital, Gynaecology & Obstetrics Department, which aims to assess the value of uterine artery flow measurement at mid pregnancy as a predictor for recurrence of Preeclampsia.

The study population will consist of one group comprising 150 pregnant women with history of PIH in a previous pregnancy.

Patients to be excluded (exclusion criteria)

- a- Chronic Hypertension.
- b- Diabetes Mellitus.
- c- Renal Disease

All Study Population will be subjected to:

- Taking detailed history.
- Clinical Examination.
- Informed Consent shall be obtained
- Routine sonographic examination at 18-20 weeks and at 32 to 34 weeks gestation.
- Doppler flow velocimetry of uterine artery at 20-24 weeks gestation.
- Serum Uric Acid at 18-20 weeks and at 32-34 weeks gestation.
- Test of proteinuria at 18-20 weeks and at 32-34 weeks gestation.
- Routine Antenatal Care till delivery and recording of the foetal outcome in the form of:
 - Mode of delivery.
 - Foetal weight.
 - Placental weight.

Statistics

All data collected will be tabulated and statistically analysed.

References

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الملخص العربي

تسمم الحمل هو مرض فريد للانسان و يصيب 5-7 % من الحوامل من أكثر الأسباب شيوعا للضاعفات و الوفاة للأم الجنين.

توجد العديد من النظريات التي تفسر حدوث تسمم الحمل مما يجعل السبب الرئيسي لحدوث تسمم الحمل غير معروف، نظرية نقص وصول الدم للمشيمة تعتبر أحد النظريات التي تفسر حدوث تسمم الحمل عن طريق التأثير على خلايا النسيج الطلائى للأوعية الدموية مما يؤدي إلى نقص تغذية المشيمة بالدم و بالتالي يؤدي إلى تحرير العديد من المؤثرات التي تعمل على حدوث سلسلة من التغيرات مما يجعل تسمم الحمل يؤثر على عدة أجهزة.

العديد من الأبحاث حاولت الوصول الى اختبارات معينة لتوقع حدوث تسمم الحمل قبل ظهور الأعراض التقليدية و للتمييز بين تسمم الحمل وأضطرابات ارتفاع الضغط العالى. إن سبب الاختبارات المبكرة لتوقع حدوث تسمم الحمل هو المحاولة لتوقع الحمل الخطر مما يسمح بتعديل الرعاية أثناء الحمل و محاولة استخدام اساليب العلاج لمنع تسمم الحمل.

يعتبر حدوث تسمم الحمل المصاحب لزيادة المقاومة فى الشريان الرحمى من العوامل التى تزيد من فرصة تكرار تسمم الحمل فى الحمل التالى.

التغيرات التى تحدث أثناء دراسة قياس سرعة تدفق الدم فى الشريان الرحمى لها الأفضلية مقارنة بقياس نسبة هرمون الحمل و ذلك فى تحديد التغيرات الباثولوجية التى تحدث فى المشيمة و ما تودى له من ولادة مبكرة ، تردى نمو الجنين و تسمم الحمل فى الحمل الخطر.

يعتبر دراسة تدفق الدم فى الشريان الرحمي باستخدام الدوبلر في منتصف الحمل اختبار مفيد لتوقع حدوث تسمم للحمل و مضاعفات الحمل الخطر و يمكن استخدامه كمسح طبي للحمل الطبيعي.

و الهدف من هذه الدراسة هى قياس سرعة تدفق الدم فى الشريان الرحمى لعدد 150 امرأة حامل سبق حدوث تسمم حمل لهن فى الحمل السابق كمؤشر لتوقع حدوث تسمم الحمل في الحمل الحالي.

و يتم متابعة الحمل لهن و عمل تحاليل متابعة الحمل و قياس سرعة الدم فى الشريان الرحمي فى فترة الحمل من 20 إلى 22 اسبوع و متابعتهم حتى الولادة و تسجيل الملاحظات أثناء الحمل و الولادة.

قياس سرعة تدفق الدم في الشريان الرحمي في منتصف الحمل كمؤشرات لتكرار حدوث تسمم الحمل

خطة بحث

توطئة للحصول على رسالة الماجستير في أمراض التوليد و النساء

مقدمة من

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INTRODUCTION

Pregnancy induced Hypertension (PIH), is a syndrome of hypertension and proteinuria, it is a unique hypertensive disorder to human pregnancy. It complicates 5-7 % of all pregnant women and it is the most common cause of maternal and foetal morbidity and mortality (**Cunningham et al., 2001**).

Preeclampsia has been called “a disease of the theories” illustrating the fact that the etiology of preeclampsia remains largely unexplained. Placental ischemia Theory: Ischaemia could inflict the endothelial cell dysfunction. These lead to poor placental perfusion and placental ischemia, resulting in release of many factors that are capable of acting on peripheral sites around the body leading to a cascade of events, making preeclampsia a multi-system disorder syndrome. (**Ledger, William L., 2004**)

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The reason for early screening for preeclampsia is to try to identify high-risk pregnancies allowing modification of antenatal care in this group and to allow preventive treatment regimens. (**Ledger, William L., 2004**)

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Doppler evaluation of the uterine artery at mid gestation represents a useful predictive test for preeclampsia and adverse pregnancy outcome in High risk pregnancy and can be used in prenatal surveillance of a low risk population **(Caforio et al., 1999)**.

AIM OF THE WORK

To determine whether uterine artery Doppler done at mid gestation can be used a predictor for the recurrence of Pregnancy Induced Hypertension namely preeclampsia.

PREECLAMPSIA

Definitions:

Preeclampsia is defined, according to the National High Blood Pressure Education Program Working Group as, a syndrome consisting of hypertension and proteinuria that may also be associated with myriad other signs and symptoms, such as edema, visual disturbances, headache, and epigastric pain (**The National High Blood Pressure Education Program, 2000**).

Hypertension is defined as sustained blood pressure elevation to 140 mmHg systolic or greater, or 90 mmHg diastolic or greater on two occasions ≥ 6 hours apart. Significant proteinuria is defined as more than 0.3 gm a 24-hour urine collection or 0.1 g per L (more than 2+ on the dip stick) in at least two random samples collected 6 hours or more apart. Since the development of edema is subjective and considered pathologic only if it is generalized (involving hands, face and legs), currently this sign is not accepted as necessity in the definition (**Wiltin and Sibai, 1999**).

Classification of hypertensive disorders complicating pregnancy:

There are five types of hypertensive disease that complicate pregnancy: as shown in table (1).

Table (1): Classification of hypertensive disorders complicating pregnancy

Gestational Hypertension

BP \geq 140/90 mm Hg for first time during pregnancy
 No proteinuria
 BP return to normal < 12 weeks postpartum
 Final diagnosis made only postpartum
 May have other signs of preeclampsia, for example, epigastric discomfort or thrombocytopenia

Preeclampsia

Minimum criteria

BP \geq 140/90 mm Hg after 20 weeks' gestation
 Proteinuria \geq 300 mg/24 h or \geq 1+ dipstick
Increased certainty of preeclampsia
 BP \geq 160/110 mm Hg
 Proteinuria 2.0 g/24 h or \geq 2+
 Serum creatinine > 1.2 mg/dL unless known to be previously elevated
 Platelets < 100,000/mm³
 Microangiopathic hemolysis (increased LDH)
 Elevated ALT or AST
 Persistent headache or other cerebral or visual disturbance
 Persistent epigastric pain

Eclampsia

Seizures that cannot be attributed to other causes in a woman with preeclampsia

Superimposed Preeclampsia (on Chronic Hypertension)

New-onset proteinuria \geq 300 mg/24 h in hypertensive women but no proteinuria before 20 weeks' gestation
 A sudden increase in proteinuria or blood pressure or platelet count < 100,000/mm³ in women with hypertension and proteinuria before 20 weeks' gestation

Chronic Hypertension

BP \geq 140/90 mm Hg before pregnancy or diagnosed before 20 weeks' gestation
 or
 Hypertension first diagnosed after 20 weeks' gestation and persistent after 12 weeks' postpartum

Adapted from National High Blood Pressure Education Program: Working Group Report on High Blood Pressure in Pregnancy. Am J Obstet Gynecol 183: 51, 2000

Incidence and Risk Factors for Preeclampsia:

Preeclampsia, which affects 2-5% of pregnancies, is a major cause of perinatal and maternal morbidity and mortality (**Papageorgiou et al., 2005**).

The likelihood of developing preeclampsia is increased in women who are nulliparous, aged 30 years or over, those with a prior or a family history of preeclampsia (preeclampsia in the mother or sister), those with body mass index (BMI) of 35 or above and those with pre-existing vascular disease, such as hypertension or diabetes (**Papageorgiou et al., 2005**).

The identification of underlying risk factors for preeclampsia is made more difficult by the probability that the diagnosis covers more than one condition, which follows a broadly common pathway from the second trimester to delivery. The clinical presentation of preeclampsia is highly variable, and there are differences between the clinical definition and those used in research (**Higgins and De Swiet, 2001**).

Risk Factors for PE:

1-Parity:

Nulliparity is a statistically significant risk factor for preeclampsia/eclampsia (**Gaio et al., 2001**).

2-Previous Preeclampsia:

Compared to nulliparous women, women with preeclampsia in a previous pregnancy had significantly higher rates of preeclampsia and adverse perinatal outcomes associated with preterm delivery as a result of preeclampsia **(Hnat et al., 2002)**.

3-Age:

Young adolescents are at increased risk for adverse pregnancy outcomes as preeclampsia, eclampsia, preterm delivery and low birth weight **(Eure et al., 2002)**.

4-Gestational Age:

A peak of gestational age incidence is seen after 20 weeks gestation. Rarely PE does develop earlier than this except in cases of hydatidiform degeneration **(Cunningham et al., 2001a)**.

5-Obesity:

Overweight nutritional status (obesity and pre-obesity) was seen in 25% of adult pregnant women and it was associated with increased risk for several adverse pregnancy outcomes, such as gestational diabetes and preeclampsia **(Nucci et al., 2001)**.

6-Genetic Factor:

According to data on approximately 1.7 million births, a woman who becomes pregnant by a man who