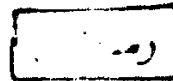


**HEMODYNAMIC CHANGES  
IN RENAL ARTERY BLOOD FLOW  
USING COLOR DOPPLER ULTRASONOGRAPHY  
IN NEONATES WITH PERINATAL ASPHYXIA**

**THESIS**



Submitted for Partial Fulfillment of Master Degree in Pediatrics

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



In the Name of God,  
Most Merciful,  
Most Compassionate

## **ACKNOWLEDGEMENT**

*I wish to express my deep gratitude to Professor Dr. Nancy Abdel-Aziz Soliman, Professor of Pediatrics at the Faculty of Medicine of Ein Shams University, for her enlightening, supervision, constructive criticism, and continuous care and kind support throughout this work.*

*I would also like to extend my most sincere thanks to Dr. Nebal El-Raggal, Lecturer of Pediatrics at Ein Shams University Hospital. In fact, her unrelenting help and guidance, and her genuine support have greatly contributed to bring this study to its present form. I am also deeply obliged to Dr. Hanan Mohammad Eisa, Lecturer of Radiology, Ein Shams University Hospital for her most valuable advice and cooperation, and her constant and unlimited help and encouragement all through.*

*May God reward them for all they did.*

**Maha A. Ragab**

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## INTRODUCTION

Newborn infants with asphyxia are believed to be at increased risk of having renal dysfunction because of hemodynamic disturbance in normal circulation as a result of perinatal hypoxaemia (*Kliegman et al., 1982, Nowicki et al., 1984, Akinbi et al., 1994*).

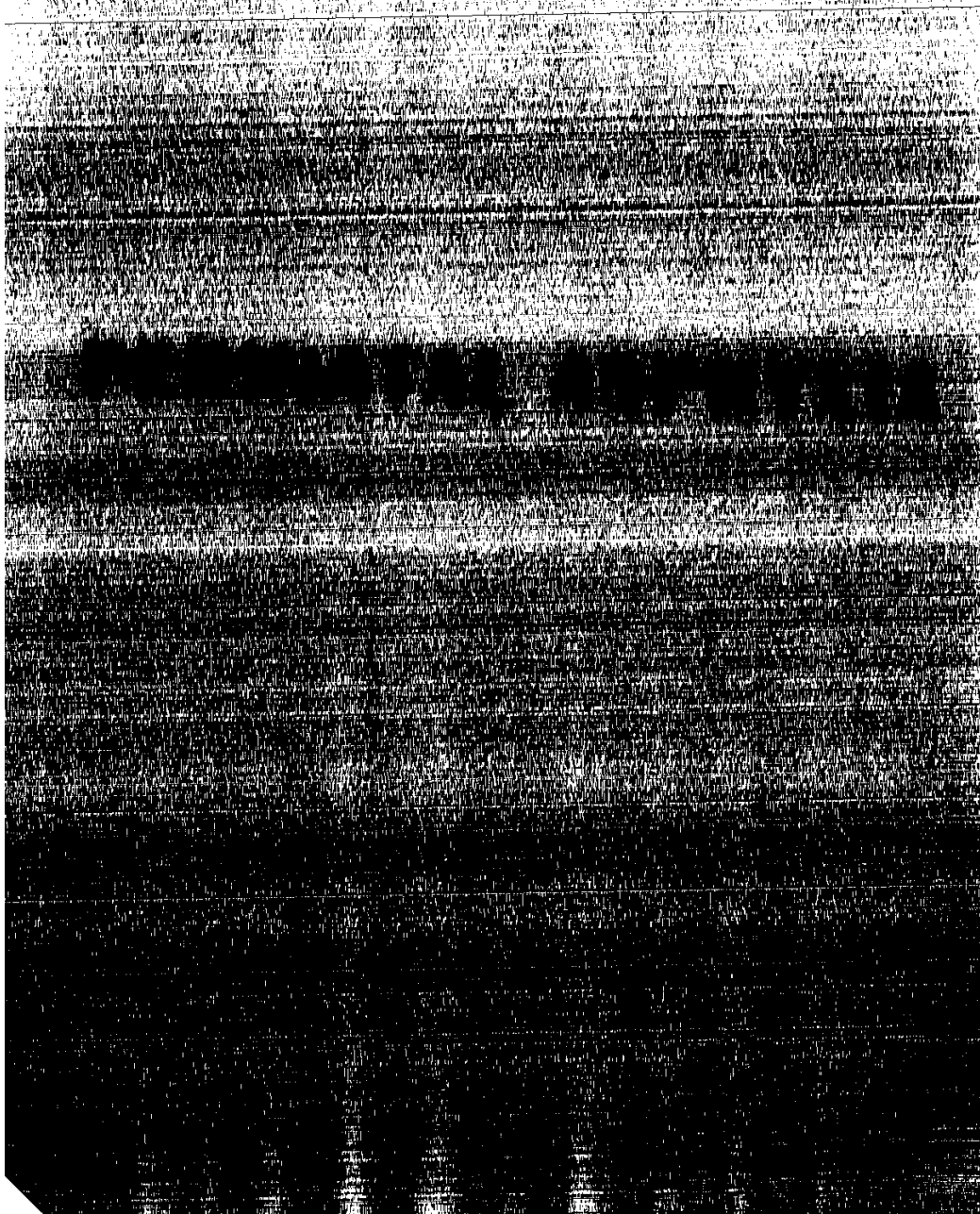
Before the availability of specially designed and highly sensitive color duplex Doppler ultrasound probes, it was difficult to assess the degree of hemodynamic disturbance in the kidneys without resorting to more invasive means (*Visser et al., 1992*).

*Akinbi et al. (1994)* studied the pulsed Doppler ultrasound renal blood flow velocity profiles and showed that this technique was more reliable for assessing haemodynamic disturbances than the blood flow volume measurements. Moreover, they observed a significant direct correlation between the reduction of peak velocity and increased resistance in the renal arteries to the severity of asphyxia. This was compatible with the frequent finding of elevated serum creatinine concentration and reduced urine output in neonates with birth asphyxia. The same authors suggested that the occurrence of this renal dysfunction affects parental fluid and drug therapy.

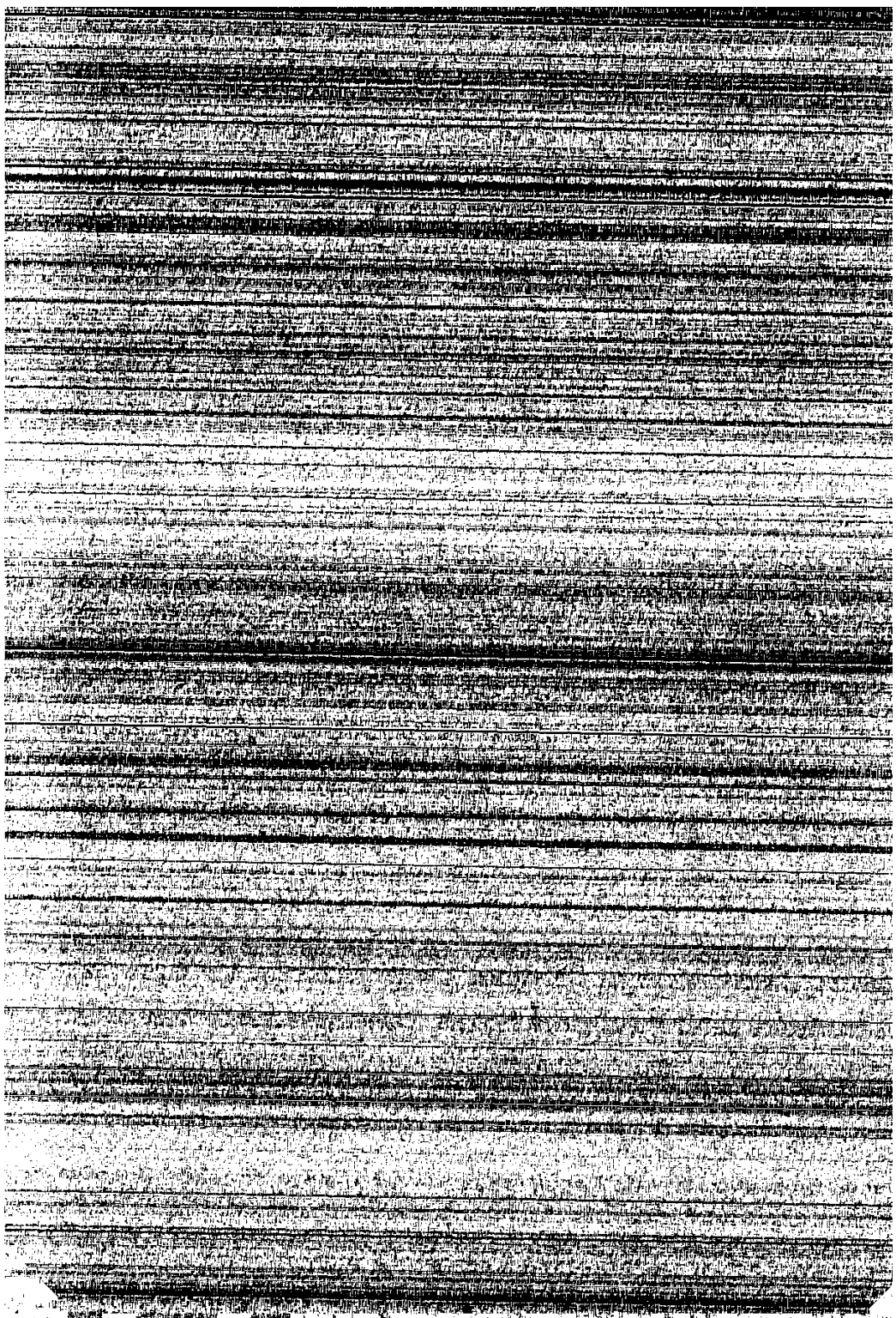
# Aim of the Work

## **Aim of the Work**

The aim of this work was directed towards assessment hemodynamic disturbances in blood circulation through the kidneys that are particularly vulnerable to hypoxic-ischemic injury by utilization of color flow image and pulsed Doppler ultrasonographic technique.







# **PERINATAL ASPHYXIA**

## **Definition**

Asphyxia is defined as suffocation leading to impairment in exchange of respiratory gases; Oxygen and Carbon dioxide, that result in hypoxia which refers to an arterial concentration of oxygen that is less than normal, and/or ischemia, which refers to blood flow to cells or organs that is insufficient to maintain their normal function (*Kliegman, 1996*).

American Academy of Pediatrics (AAP) and American College of Obstetricians and Gynecologists (ACOG) Committees on Maternal-Fetal Medicine and Fetus and Newborn in 1992 defined certain criteria that must be present for resultant neurologic deficits (Table 1). In cases in which such evidence is lacking, it cannot be concluded that perinatal Asphyxia exists.

**Table (1)**

Essential Criteria for Perinatal Asphyxia

- 
1. Profound metabolic or mixed acidemia (pH <7.00) on an umbilical cord arterial blood sample.
  2. Persistence of an Apgar score of 0 to 3 > 5 minutes.
  3. Clinical neurologic sequelae in the immediate neonatal period (e.g. seizures, hypotonia, coma, or HIE).
  4. Evidence of multiorgan system dysfunction in the immediate neonatal period
- 

*(American Academy of Pediatrics and American College of Obstetricians and Gynecologists, quoted from: Guidelines for Perinatal Care, 1992)*

### **1- Acidemia:**

Develops in hypoxemic infant as a result of use of anaerobic glycolysis to meet its energy needs. It is classified as respiratory where  $\text{PCO}_2$  is high and  $\text{HCO}_3$  is normal, metabolic where  $\text{PCO}_2$  is normal and  $\text{HCO}_3$  is low or mixed acidemia (*Rivkin and Volpe, 1996*).