# FETAL MACROSOMIA:RISK FACTORS,DIAGNOSIS AND IMPACT ON LABOUR

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**بسم الله الرحمـــن الرحيم**

# وقل ربی زدنی علما

**صدق الله العظيم**

# ABSTRACT

Macrosomia can be defined as birth weight equal to or exceeding 4000gm. The etiology of fetal macrosomia is believed to be multifactorial. Fetal macrosomia has an important impact on both fetus and mother. Maternal complications include arrest disorders, protraction disorders, and instrumental delivery with more obstetric lacerations, post partum hemorrhage, puerperal infections, cesarean delivery and shoulder dystocia. Fetal complications include birth injuries, asphyxial injuries, neonatal hypoglycemia as well as childhood and adolescent obesity. Accurate prenatal diagnosis of macrosomia is important for planning and timing of the method of delivery. Diagnosis can be done through risk assessment, clinical estimation of fetal weight and Ultrasonography. Preventive factors of fetal macrosomia include reduction of pre-pregnancy weight and weight gain during pregnancy, limitation of post term pregnancy and control of diabetes. The management of patients with suspected fetal macrosomia is controversial. Elective cesarean delivery and labor induction have been proposed as interventions to prevent maternal and perinatal complications.



**Key words:** fetus, macrosomia, diabetes, shoulder dystocia.

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# CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# LIST OF ABBREVIATIONS

**AC:** Abdominal Circumference

**ACOG:** American College of Obstetrics and Gynecology

**AFI:** Amniotic Fluid Index

**BMI:**Body Mass Index

**BPD:** Biparietal Diameter

**BWT:** Birth Weight

**CRL:** Crown Rump Length

**CNS**:Central Nervous System

**CS:** Cesarean Section

**CT:** Computerized Tomography

**DFE:** Distal Femoral Epiphysis

**EFW:** Estimated Fetal Weight

**FDL:** Femur Diaphysis Length

**FL:** Femur Length

**GA**:Gestational Age

**GDM:** Gestational Diabetes Mellitus

**GTT:** Glucose Tolerance Test

**HA:** Head profile Area

**HC:** Head Circumference

**IDDM:** Insulin Dependent Diabetes Mellitus

**IGF-I:** Insulin like Growth Factor I

**IGF-II:** Insulin like Growth Factor II

**LGA:** Large for Gestational Age

**MRI:**Magnetic Resonance Imaging

**NICU**:Neonatal Intensive Care Unit

**NIDDM:** Non Insulin Dependent Diabetes Mellitus

**NS:** Not Significant

**OFD**: Occipto Frontal Diameter

**PGA:** Poly Glycolic Acid

**PHE:** Proximal Humeral Epiphysis

**Pro-CS:**Prophylactic Cesarean Section

**SD:** Shoulder Dystocia

**STM**: Soft Tissue Mass

**TC:** Thoracic Circumference

**TCD:** Trans Cerebellar Diameter

**ThC:** Thigh Circumference

**TrC:**Trunk Circumference

**UC**:Umbilical Cord

**UK:** United Kingdom

**VD:**Vaginal Delivery

**WE:** Weight Estimation

# AIM OF WORK

**In the present study our aim of work is to study the problem of fetal macrosomia with its risk factors,maternal and fetal complications and its impact on labour.**

# INTRODUCTION

Fetal macrosomia is defined as fetus that is of large size for gestational age equal to or greater than the 90$^{th}$ percentile.

Large for gestational age fetuses can be a result of genetic variance,excessive growth secondary to over weight mothers ,excessive maternal weight gain during pregnancy and gestational diabetes or insulin dependent diabetes mellitus**( Haram et al ,2002).**

There is some evidence of increased perinatal mortality and morbidity rates in cases of macrosomia. A number of problems during delivery ,such as prolonged duration of delivery ,an increased risk of cesarean section and postpartum hemorrhage have been widely reported**( Boulet et al, 2006).**

Unless there are additional indications ,there is currently no solid evidence to support induced labour or elective cesarean section in non diabetic patient with suspected fetal macrosomia. Instead, it is recommended that spontaneous delivery should be awaited ,or the labour should be induced only when indicated **(Impey et al ,2000).**

Unfortinately, despite advances in ultrasound technology , our longstanding experience in obtaining fetal biometric measurementand research efforts to date ,the diagnosis of macrosomia still remains problematic(**Chauhan et al, 2005).**

# DEFINITION

Several definitions of fetal macrosomia exist, the most common: an absolute birth weight greater than 4500gm, an absolute birth weight greater than 4000gm, a birth weight greater than $90^{th}$ centile for gestational age. These definition based on the measurement of infants after delivery (retrospective diagnosis).

The American College of Obstetric and Gynecology defines macrosomia as infant with absolute BW > 4500gram irrespective of gestational age or other demographic variable.

A grading system of macrosomia has been described. This grading system has been used in the research setting to determine maternal and neonatal outcome associated with fatal macrosmia.

Macrosmic infant classified in to 3 grades:

- Grade 1: 4000-4499gm
- Grade 2: 4500-4999gm
- Grade 3: > 5000gm.

**(Boule et al, 2003)**

# INCIDENCE:

Globally: the incidence of macrosomic newborn is increasing.

Fetal macrosomia occurs with an incidence of approximately (8-10%) in developed countries**. (Wollschlaeger et al, *1999)***

# PATHOGENESIS OF FETAL MACROSOMIA

Determination of the mechanism that leads to inutero overgrowth has proved elusive because our knowledge has significantly expanded as a result of the generation of experimental mouse models engineered to disrupt the expression of one or more genes , and by detailed molecular and genetic analysis of infants and children with overgrowth syndromes . Studies, which were done on mice , have largely defined the essential role of insulin like growth factors (IGF 1 and IGF II) , insulin and their receptors in embryonic and fetal growth **(Sotos ,1997)**

## Hyperinsulinism:

Hyperinsulinism has long been associated with fetal overgrowth .The precise mechanism by which excessive insulin stimulates overgrowth however remains unclear **(Sacks,2007).**

Although maternal hyperglycaemia appears to be the most common cause of fetal hyperinsulinism , substrates other than glucose such as a branched - chain amino acids may stimulate insulin production. Also a stimulatory effect of insulin binding antibodies of maternal origin can not be excluded **(Persson et al , 1986)**.

Fetal hyperinsulinemia occurs in uncontrolled diabetic mothers , and in infants with primary pancreatic pathology , such as islet cell hyperplesia and islet adenomatosis **(Sotos,1997)**.

Regardless of the aetiology , infants with hyperinsulinism often exhibit an increased birth weight.However increased linear growth in- utero , while cleary occurring in some of these infants ,is less well documented . It is , therefore ,not certain whether all of these

infants are truly overgrown , that is, have somatic cellular hyperplesia. In many of these infants ,the increased weight may be due to increased adipose tissue and glycogen stores, which can readily be attributed to the action of insulin**(Verma et al,1997).**

Macrosomia or fetal obesity is a frequent complication of pregnancy in diabetes mellitus. Several alterations observed in carbohydrate and lipid metabolism in macrosomic infants of diabetic mothers are thought to be a consequence of maternal hyperglycemia leading to fetal hyperinsulinaemia. Macrosomic infant of diabetic mother are prone to the development of glucose intolerance,obesity and diabetes during childhood and adulthood **(Merzouk and khan,2003).**

Both clinical and experimental evidences support the central role of hyperinsulinism in the development of fetal macrosomia **(Schwartz et al,1994).**

Insulin(C-peptide) should be determined in cord blood to define the degree of hyperinsulinemia .Glucose should be determined in plasma at birth and at regular intervals thereafter for detection of neonatal hypoglycaemia .It should be noted that diagnosis of hypoglycaemia cannot be based on glucose measurements with reagent strips**(Schwartz,1999).**

Nonetheless, when the glucose intolerance of diabetic pregnant women is well controlled, fetal hyperinsulinism does not occur or is minimal and these infants exhibit neither increased birth size nor an Increased incidence of other consequences of the disorder **(Barbour, 2003).**

## Relation between insulin-like growth factors and fetal macrosomia: