



## Recent Trends for Investigations in Prenatal Care

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**ABSTRACT**

*Pregnancy is a physiological process. Normal duration of pregnancy in human is 10 lunar months. Diagnosis of pregnancy is required to detect wellbeing of mother and child and to provide adequate antenatal care. Diagnosis is based on various clinical and laboratory tests. Routine testing is required in all pregnant women. In certain women specific testing is required. Ultra sonography is required in all cases.*

**KEYWORDS :** pregnancy, immunological test, biological test, blood test, urine test, ultrasonography

**INTRODUCTION:**

Pregnancy is conception of fertilised ovum to delivery of fully formed baby. In Humans its duration is 10 lunar months or 9 calendar months and 7 days. It is divided in three trimesters-

1<sup>st</sup> :from conception to 12 weeks ;

2<sup>nd</sup> : 13<sup>th</sup> to 28<sup>th</sup> week

3<sup>rd</sup> : 29<sup>th</sup> till delivery

Diagnosis of pregnancy can be done by various methods like,

Signs and symptoms,

Clinical examination and

Various tests- immunological, blood, urine, imaging, biological (not used now)

**AIMS OF INVESTIGATIONS:**

- To define health status of the mother and foetus
- Estimate the gestational age
- Initiate a plan for continuing obstetrical care

**❖ Immunological tests to detect pregnancy**

**Principle**-detection of antigen ( $\delta$  hCG) in maternal serum or urine with commercially available monoclonal/polyclonal antibody.

**A) Immunoassays without radioisotopes-** **AGGLUTINATION INHIBITION TESTS**

- Latex test
- Sample -urine
- Absence of agglutination → pregnancy
- +ve 2 days after missed periods
- Detects hCG level 0.5-1 IU/ml

 **DIRECT AGGLUTINATION (HCG DIRECT) TEST**

- Latex test
- On Urine sample
- Presence of agglutination → pregnancy
- +ve 2 days after missed periods
- Sensitivity-0.2 IU/ml

 **ELISA**

- Two site sandwich assay
- Urine test
- +ve on 1<sup>st</sup> day of missed periods

- Serum ELISA test detects 5 days before missed periods
- Sensitivity- up to 1-2 mIU/ml

 **FLUOROIMMUNO ASSAY(FIA)**

- Highly precise
- Uses fluorescent antibody
- Detects 1mIU/ml in 2-3 hrs.

**B) Immunoassay with radioisotopes-** **RADIOIMMUNOASSAY (RIA)**

- Serum test
- Uses  $I^{125}$
- More sensitive
- Detects hCG 8-9 days after ovulation(25<sup>th</sup> day of cycle)
- 3-4 hrs required
- Sensitivity-0.002 IU/ml

 **IMMUNO-RADIOMETRIC ASSAY(IRMA)**

- Sandwich principle
- Serum sample
- $I^{125}$  labelled antibodies used
- In 30 min
- Detects on 8<sup>th</sup> day after conception
- Sensitivity-0.05 mIU/ml
- Costly

**BIOLOGICAL TESTS**

- Performed on experimental animals
- Done after 2 to 3 weeks of conception
- Obsolete now.
- ASCHHEIM -ZONDEK TEST

**Immature mice**

- KUPPERMAN TEST

**Immature rat**

- FREIDMAN TEST

**rabbit**

- HOGBEN TEST

**toad**

- GALLI-MAININI TEST

**amphibian (toad or frog)****BASIC INVESTIGATIONS**

- WEIGHT CHECK**

**□ BLOOD PRESSURE MEASUREMENT**

**□ BLOOD:**

➤ **Hemoglobin /hematocrit level**

- Total count
- Blood group Rh
- Blood sugar

➤ **Infection screening:**

- Serum VDRL/ RPR titre
- Serum Hepatitis B surface antigen(HbsAg)
- Serum HIV

**□ URINE COMPLETE:**

- Sugar
- Albumin
- Infection

**□ PAP SMEAR**

**□ ULTRASONOGRAPHY**

**□ SPECIFIC INVESTIGATIONS**

- Rubella titre- rule out immunity to Rubella(Ig G)
- Serum protein level- in cases of preeclampsia, severe IUGR, anaemia
- Serum creatinine and urea level- in preeclampsia
- Serum uric acid level -in preeclampsia
- Serum level of liver enzymes and bilirubin - in preeclampsia, in suspected HELLP syndrome
- Gonococcal and Chlamydia culture
- Atypical antibody screening -
  - Antiphospholipid Ab (APA)
  - Anticardiolipin Ab (ACA)
  - Lupus anticoagulant(LAC)
- Genetic screening- maternal Alpha fetoprotein (MSAFP) -15 to 20 weeks
- Triple test for Down's syndrome-
  - ↓MSAFP, ↓ UE3, ↑hCG -15-18 weeks
- Quadruple test-
  - ↓MSAFP, ↓ UE3, ↑hCG, inhibin A -15-18 weeks
- Acetyl choline esterase- in open neural tube defect
- Amniocentesis-14-16 weeks
- Chorionic villus sampling- after10 weeks
- Cordocentesis-18-20 weeks
- Grp B Streptococcal culture
- 2D ECHO in cases of cardiac disease

**CLINICAL**

1) **WEIGHT RECORD-**

- ✓ Determine baseline wt.
- ✓ Determine BMI (wt in kg/ht in mt<sup>2</sup>)
- ✓ Determine weight gain during pregnancy.
  - o ideal 10-12 kgs
  - o if pre pregnancy BMI < 19, allow up to20 kg wt gain.
  - o If pre pregnancy BMI 19-25, allow up to 12 Kg
  - o If pre pregnancy BMI >26 , allow up to 7 kg wt gain.
- ✓ Early detection of rapid gain in weight or stagnant weight gain.
- ✓ Helps to detect early preeclampsia or IUGR fetus.

2) **BLOOD PRESSURE**

- ✓ Bp record at every visit
- ✓ Disappearance of sound is taken as diastolic BP.
- ✓ Should not be >130/80 mm Hg
- ✓ Taken in sitting or supine position after 5 min of rest
- ✓ Helps determine early preeclampsia.

**BLOOD INVESTIGATIONS:**

1) **HAEMOGLOBIN /HCRT LEVEL**

**WHY?**

- ✓ Hb level determine oxygen carrying capacity of blood .
- ✓ Sufficient amount of Hb(12 gm%) required for adequate growth of foetus as well as health of mother.
- ✓ Physiological haemodilution of pregnancy occurs from 2<sup>nd</sup> trimester.
- ✓ Anemia in pregnancy is common in India.
- ✓ Anemia causes..weakness, bodyache, lassitude ,easy fatigue, an-

orexia, indigestion ,palpitation, dyspnoea ,giddiness , swelling of legs.

- ✓ During labour, good hemoglobin strengthens mother to pass through the labour process easily.

**WHEN ?**

- ✓ On 1<sup>st</sup> visit of patient
- ✓ Repeat at 20-24 weeks,32-36 weeks and near term
- ✓ Repeated more frequently after giving treatment of anaemia

**NORMAL RANGE-**

12-15 mg%

2) **Total WBC count**

**WHY?**

- ✓ RULE OUT INFECTION IN BODY
- ✓ Infection anywhere in body causes anaemia, abortion, preterm labour, PROM etc.
- ✓ Do baseline WBC count and treat the infection accordingly with safe antibiotics like Amoxicillin or 3<sup>rd</sup> generation Cephalosporin.
- ✓ Repeat the count after treating infection.

**NORMAL RANGE-**

4000-11000/cu mm

3) **BLOOD GROUP Rh**

**WHY?**

- ✓ Determine blood group of mother and father (if MOTHER HAS NEGATIVE BLOOD GROUP) to determine expected blood group of foetus.
- ✓ If negative mother delivers positive foetus, then chances of developing Rh antibodies in mother are high, which affects 2<sup>nd</sup> pregnancy adversely.
- ✓ If at any time blood transfusion is required, blood group is required to check availability of blood.

**WHEN?**

- ✓ 1<sup>st</sup> visit. if negative , then do husband's blood group.
- ✓ If husband's bloodgroup is negative, NO further Ix needed.
- ✓ If husband's bloodgroup positive, do INDIRECT COOMB'S TEST at 28 weeks.

4) **BLOOD SUGAR**

**WHY?**

To determine gestational diabetes or diabetes mellitus with pregnancy

**WHEN?**

- ✓ 1<sup>st</sup> trimester- fasting(<120mg%) and postprandial (<140mg%).
- ✓ If normal then GLUCOSE CHALLENGE TEST at 24-28 weeks with 75 gms of glucose(WHO criteria)
- ✓ If positive(>140mg%) do GLUCOSE TOLERANCE TEST.
- ✓ if negative then repeat at 32- 34 wks.

**HOW?**

- ✓ Glucometer
- ✓ Dextrostix

5) **Serum VDRL/RPR**

**WHY?**

To rule out syphilis with pregnancy.

**WHEN?**

- ✓ IN 1<sup>ST</sup> ANTENATAL VISIT.
- ✓ If positive(within 4wks of infection),confirm with FTA-ABS.
- ✓ Test husband also.

6) **Serum Hbs Ag**

**WHY?**

- ✓ Rule out present or past infection with hepatitis B as Hbs Ag is the first marker to appear after infection and may lasts up to 6 months
- ✓ To take safety precautions during labour process.

**WHEN?**

- ✓ IN 1<sup>ST</sup> ANTENATAL VISIT.
- o IF POSITIVE ,then do husband's test as well

**7) Serum HIV**

**WHY?**

- ✓ Rule out infection with HIV.
- ✓ To take safety precautions during labour process.
- ✓ To determine whether to give ART medication to patient or not.

**WHEN?**

- ✓ IN 1<sup>ST</sup> ANTENATAL VISIT.
- ✓ IF POSITIVE ,then do husband's test as well

**URINE EXAMINATION**

**WHY?**

- ✓ Rule out urine sugar
- ✓ Rule out urine protein
- ✓ Rule out urinary infection
- ✓ Rule out crystals in urine

**WHEN?**

- ✓ In 1<sup>st</sup> antenatal visit
- ✓ When patient complaints regarding urinary problems

**HOW?**

Collect midstream urine

**for sugar-**

- BENEDICT'S TEST
- DIPSTICKS (diastix)

**for protein**

- HEAT AND ACETIC ACID TEST
- DIPSTICKS(albustix)

**For infection-**

- DIPSTICKS detects of leucocyte esterase and nitrites

**For acetone-**

- ROTHERA'S TEST
- KETOSTIX

**PAP SMEAR**

**WHY?**

- Cervical cancer is the 2<sup>nd</sup> most common cause of death in India
- Rule out cervical cancer during pregnancy
- Determine line of management

**WHEN?**

- In Second trimester
- Suspicious cervix, undiagnosed bleeding per vaginum

**ULTRASONOGRAPHY**

**1<sup>ST</sup> TRIMESTER SCAN:**

- Tranabdominal (TAS) or transvaginal (TVS)scan To determine -
- INTRAUTERINE LOCATION :- 5-6weeks-G. sac
- ACCURATE DATING:- (CRL in mm+42= g.age)
- CARDIAC ACTIVITY:- cardiac activity at 7 weeks
- NO. OF FETUSES:- twins/triplets/quadruplets..
- GROSS FETAL ANOMALIES:- nuchal translucency
- ANY CHORIONIC SEPERATION
- ANY UTERINE OR ADNEXAL PATHOLOGY:- fibroids , ovarian cysts

**2<sup>nd</sup> TRIMESTER SCAN(18-20 weeks):**

- Gestational age determination – BPD,HC,AC,FL
- Detail fetal anatomy to Rule out anomalies –
- neural tube defects (anencephaly ,hydrocephalus, spina bifida)
- Omphalocele , gastroschisis
- Hydrops fetalis
- Cord abnormality
- determine growth and weight of fetus
- placental location and abnormalities
- Amniotic fluid volume
- Doppler studies in high risk pregnancies- uterine artery , umbilical artery , middle cerebral artery, inferior vena cava , ductus venosus

**3RD TRIMESTER SCAN:**

- Growth
- Detailed anatomical survey
- liquor
- fetal weight
- baseline for biophysical profile.

**TABLE 1. TYPICAL COMPONENTS OF PRENATAL CARE**

INVESTIGATION	1 <sup>ST</sup> VISIT	15-20 WEEKS	24-28 WEEKS	29-41 WEEKS
<b>HISTORY COMPLETE UPDATED</b>	✓	✓	✓	✓
<b>COMPLETE PHYSICAL EXAMINATION</b>	✓			
<b>BLOOD PRESSURE</b>	✓	✓	✓	✓
<b>MATERNAL WEIGHT</b>	✓	✓	✓	✓
<b>PELVIC/CERVICAL EXAMINATION</b>	✓			
<b>FUNDAL HEIGHT</b>	✓	✓	✓	✓
<b>FETAL HEART RATE /POSITION</b>	✓	✓	✓	✓
<b>LAB TESTS</b>				
<b>HEMOGLOBIN/ HAEMATOCRIT</b>	✓		✓	
<b>BLOOD GROUP Rh factor</b>	✓			
<b>ANTIBODY SCEEEN</b>			at 28 weeks If indicated	
<b>PAP SMEAR</b>	✓			
<b>GLUCOSE TOLERANCE TEST</b>			✓	
<b>FETAL ANEUPLOIDY SCREENING</b>	Offered at 11-14 weeks	offered		
<b>NEURAL TUBE DEFECT SCREENING</b>		offered		
<b>CYSTIC FIBROSIS SCREENING</b>	offered	offered		
<b>URINE PROTEIN ASSESSMENT</b>	✓			
<b>URINE CULTURE</b>	✓			
<b>RUBELLA SEROLOGY</b>	✓			
<b>SYPHILIS SEROLOGY</b>	✓			Retested in high risk
<b>GONOCOCCAL CULTURE</b>	In high risk			Repeat in high risk
<b>CHLAMYDIAL CULTURE</b>	✓			Retested in high risk
<b>HEPATITIS B SEROLOGY</b>	✓			
<b>HIV SEROLOGY</b>	offered			
<b>GRP B STREPTOCOCCAL CULTURE</b>	✓			Recto vaginal culture between 35 and 37 weeks

**SUMMARY**

Pregnancy is a physiological process. Even normal pregnancy requires certain basic investigations to rule out any high risk factor which can complicate pregnancy. Basic investigations done in first trimester are clinical examination(per abdominal and per vaginal examination),- blood investigations- haemoglobin and blood count, blood group Rh, urine complete, serology for HIV , Hbs Ag and VDRL; and ultrasonography- trans abdominal and transvaginal. In second trimester, certain investigations are repeated like-weight check, blood pressure measurement, haemoglobin, blood sugar, clinical examination and ultrasonography (12-20 weeks scan). Specific investigations are done in high risk patients like-preeclampsia, anemia, eclampsia, cardiac disease, liver cirrhosis etc. . In third trimester, haemoglobin and sugar is repeated in blood investigations ,follow up ultrasound study done to determine adequate growth. During labour these basic investigations are done if not done previously or done in very early pregnancy.

Thus goal of investigations in pregnancy is to give healthy child to healthy mother.

## REFERENCES

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