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Prenatal Diagnostic Screening and Outcomes of the Bangladeshi Urban Pregnant Mothers Living in the Capital City Dhaka

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Abstract:*The present study was a cross sectional study which aimed at the assessment of the prevalence of prenatal diagnostic screening and outcomes. A total of 1,000 study participants were enrolled. The sampling frame consisted of all pregnant women attending prenatal diagnostic screening at Primary Health Care Services Delivery Project (UPHCSDP), Mirpur-1, Dhaka, Bangladesh. Among the pregnant women 36.9% were in 20-25years age group, 28.7% were in 15-20years age group, 22.1% in 25-30years age group and others. In urban Bangladesh very few diagnostic screening tests are done in respect to modern world's screening practices and they are Hb, RBS, HBsAg and TPHA from blood; and epithelial and pus cell tests from urine and occasionally ultrasound test. 95.5% participants' serum were found with less than the standard Hb content and 5.1% were found with higher RBS content. Regarding epithelial and pus cell's microscopic count of the urine samples 18.2% and 23.4% participants were higher respectively. The serum was tested by ICT method to detect hepatitis B virus infection and syphilis. Screening of the 1000 study participants, whose serum samples were collected and screened only 2.4% for HBsAg and 1.1% for TPHA were positive, with detectable levels of Hepatitis B surface antigen and Tp antibodies against Tp antigen of the syphilis causing bacteria Treponema pallidum. Data compilation and analysis were done as per standard statistical methods by using the software "SPSS". Prenatal screening for Hb, RBS, epithelial and pus cell will help to maintain fetal and maternal health; Hepatitis B and Treponema pallidum are useful for early intervention and management of vertical Transmission. Escape of appropriate diagnostic screening may risky for fetal and maternal health.*

Keywords: *Prenatal screening, Hb, RBS, HBsAg, TPHA, Epithelial and Pus Cell.*

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I. Introduction

Prenatal care, also known as antenatal care, is a type of preventive healthcare. Its goal is to provide regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy and to promote healthy lifestyles that benefit both mother and child.[1,2]
The following are some of the more common tests performed during three trimesters of pregnancy:

First Trimester Prenatal Screening Tests[3]
Here are some tests a pregnant mother may undergo during the first trimester (1-12weeks) of pregnancy:

Blood tests

During one of the initial examinations, doctor or midwife will identify pregnant mother's blood type and Rh (rhesus) factor, screen for anemia, check for immunity to rubella (German measles), and test for hepatitis B, syphilis, HIV, tuberculosis (TB) and other sexually transmitted diseases.[3,4]

The number of red blood cells can show whether you have a certain type of anemia. The number of white blood cells (WBCs) shows how many disease-fighting cells are in blood, and the number of platelets can reveal whether have a problem with blood clotting. Results from a blood type test can show if mothers have the Rh factor. The Rh factor is a protein that can be present on the surface of red blood cells (RBCs). Most people have the Rh factor-they are Rh positive. Others do not have the Rh factor-they are Rh negative. If fetus is

Rh positive and mother is Rh negative, mother's body can make antibodies against the Rh factor. In a future pregnancy, these antibodies can damage the fetus's RBCs.[5]

U.S. Preventive Services Task Force (USPSTF) recommendations on screening for Rh(D) incompatibility and the supporting scientific evidence and updates the 1996 recommendations contained in the Guide to Clinical Preventive Services, 2d ed.1 In 1996, the USPSTF recommended Rh(D) blood typing and antibody screening for all pregnant women at their first prenatal visit (A recommendation). Since then, the USPSTF criteria to rate the strength of the evidence have changed.[6]

Rubella (sometimes called German measles) can cause birth defects if a woman is infected during pregnancy. Blood is tested to check whether mother has had a past infection with rubella or if mother has been vaccinated against this disease. If mother has not had rubella previously or if mother has not been vaccinated, mother should avoid anyone who has the disease while she is pregnant because it is highly contagious. If mother has not had the vaccine, mother should get it after the baby is born, even if mother is breastfeeding. Mother should not be vaccinated against rubella during pregnancy.[5]

Pregnancy-associated plasma protein screening (PAPP-A) is a protein produced by the placenta in early pregnancy. Abnormal levels are associated with an increased risk for chromosome abnormality.[4]

Hepatitis B viruses (HBVs) and hepatitis C viruses (HCVs) infect the liver. Pregnant women who are infected with HBV or HCV can pass the virus to their fetuses. All pregnant women are tested for HBV infection. If mothers have risk factors, mothers also may be tested for the HCV.[5]

An estimated 24,000 infants are born each year to women in the United States who are infected with HBV. Between 30% and 40% of all chronic HBV infections result from perinatal transmission. Chronic HBV infections increase long-term morbidity and mortality by predisposing infected persons to cirrhosis of the liver and liver cancer.[7]

All pregnant women are tested for syphilis and chlamydia early in pregnancy. Syphilis (caused by Treponema pallidum bacteria) and chlamydia (caused by Chlamydia trachomatis bacteria) can cause complications for mother and fetus. If mothers have either of these sexually transmitted infections (STIs), mothers will be treated during pregnancy and tested again to see if the treatment has worked. If mothers have risk factors for gonorrhea (mothers are aged 25 years or younger or live in an area where gonorrhea is common), mothers also will be tested for this STI.[5,8]

If a pregnant woman is infected with human immunodeficiency virus (HIV), there is a chance she can pass the virus to her fetus. HIV attacks cells of the body's immune system and causes acquired immunodeficiency syndrome (AIDS). If mother is pregnant and infected with HIV, she can be given medication and take other steps that can greatly reduce the risk of passing HIV during pregnancy, labor, or delivery.[5,8]

Women at high risk of TB (for example, women who are infected with HIV or who live in close contact with someone who has TB) should be tested for this infection.[5]

Mother's health care professional will ask questions about travel to areas with Zika. Mother's answers will help determine the needs for testing Zika virus.[5]

Tests for exposure to diseases such as toxoplasmosis and varicella (the virus that causes chickenpox) may also be done if needed.[3]

Toxoplasmosis is a disease caused by the intracellular protozoan parasite Toxoplasma gondii. Infection with T. gondii before pregnancy confers little or no risk to the fetus except in women who become infected up to 3 months before conception. In the neonate, manifestations of congenital toxoplasmosis might include hydrocephalus, microcephaly, intracranial calcifications, retinochoroiditis, strabismus, blindness, epilepsy, psychomotor and mental retardation, petechiae due to thrombocytopenia, and anemia.[9]

Congenital varicella syndrome, maternal varicella zoster virus pneumonia and neonatal varicella infection are associated with serious feto-maternal morbidity and not infrequently with mortality. Vaccination against Varicella zoster virus can prevent the disease and outbreak control limits the exposure of pregnant women to the infectious agent.[10]

Urine tests

Mother's urine may be tested for RBCs (to see if mother has urinary tract disease), WBCs (to see if mother has a urinary tract infection), pus cell (pus is a whitish or yellowish or slightly green substance which is thick like glue. Pus in urine signifies that the body is fighting an infection in the lower or upper urinary tract. Pus contains dead skin cells, bacteria and white blood cells), epithelial cells (Having a moderate number or many cells may indicate: a yeast or urinary tract infection (UTI) kidney or liver disease) and glucose (high levels may be a sign of diabetes mellitus).

The amount of urinary protein also is measured. The protein level early in pregnancy can be compared with levels later in pregnancy. High protein levels in the urine may be a sign of preeclampsia, a serious complication that usually occurs later in pregnancy or after the baby is born.[5]

Preeclampsia is a serious condition that causes high blood pressure during pregnancy. It can begin during the second half of pregnancy, during labor, or shortly after delivery. In addition to high blood pressure, preeclampsia can cause problems with the kidneys, the liver, and sometimes the eyes and brain. Some women with preeclampsia have a higher-than-normal level of protein in their urine. Preeclampsia also leads to poor growth of the fetus in the womb.[11]

A urine culture tests mother's urine for bacteria, which can be a sign of a urinary tract infection. Pregnant mother will also be asked early on for a urine sample so that doctor or midwife can look for signs of kidney infection and, if necessary, to confirm pregnancy by measuring the hCG level. (A blood hCG test to confirm pregnancy may be used instead.) Urine samples will then be collected regularly to detect glucose (a sign of diabetes) and albumin (a protein that may indicate preeclampsia, pregnancy-induced high blood pressure).[5] hCG hormone produced by the placenta in early pregnancy. Abnormal levels are associated with an increased risk for chromosome abnormality.[4]

Ultrasound test

A special ultrasound, called a nuchal translucency (NT) screening, measures baby's nasal bone as well as the fluid at the back of baby's neck. A high volume of fluid can be a sign of problems.[3]

Pregnancies in women with systemic lupus erythematosus (SLE) and/or the antiphospholipid syndrome (APS) are considered at high risk for recurrent spontaneous abortions, intra-uterine growth restriction (IUGR), pre-term delivery, pre-eclampsia, HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome and vascular thrombosis. In most tertiary referral centers, at least a monthly visit is advised for clinical and obstetric examination and laboratory tests. In France, a systematic fetal Doppler ultrasound examination is performed during each trimester in all pregnancies. The predictive value for adverse pregnancy outcome of fetal Doppler ultrasound examination has been demonstrated.[12]

Genetic Tests

Depending on racial, ethnic, or family background, a mother may be offered tests and genetic counseling to assess risks for diseases such as Tay-Sachs (neuron destruction due to genetical problem), cystic fibrosis (lungs problem due to genetical defect), and sickle cell anemia (defective hemoglobin) (if these weren't done at a preconception visit).

In the later part of the first trimester pregnant mother will be offered genetic testing. Mother first has to decide if she wants any genetic testing at all. Some people feel like these tests may cause them undue stress and they prefer to make sure the baby is genetically normal after the baby is born. Some people want to go ahead and do all the testing they can realizing that these tests sometimes are not 100% accurate. Talk with doctor about the pros and the cons before proceeding to see if genetic testing is right for pregnant mother and her pregnancy. There are different genetic testing options that involve blood tests alone or with an ultrasound that involve no risk to the fetus. If these non invasive tests are abnormal, then further testing will be offered to pregnant mother. At that point, pregnant mother can decide if she wants to do those tests or not.[3]

One first semester genetic test combines a blood test with an ultrasound to screen for Down syndrome may be available between 11 and 14 weeks of pregnancy. The results of a blood test that measures hCG and/or PAPP-A (pregnancy-associated plasma protein A) in maternal blood are used with an ultrasound measurement of the skin at the back of the fetus' neck (called nuchal translucency). The procedure may be able to pick up a substantial portion of Down syndrome cases and other genetic conditions. However, as with all screening methods, a more invasive diagnostic technique like CVS is used if results are positive.[3]

Non-Invasive Prenatal Testing (NIPT) screening: This cell-free fetal DNA test can be done as early as after 10 weeks of pregnancy. The test uses a blood sample to measure the relative amount of free fetal DNA in a mother's blood. It's thought that the test can detect 99% of all Down syndrome pregnancies. It also tests for some other chromosomal abnormalities. [3]

Chorionic villus sampling (CVS): CVS is a prenatal test that involves taking a sample of some of the placental tissue. This tissue contains the same genetic material as the fetus and can be tested for chromosomal abnormalities and some other genetic problems. Testing is available for other genetic defects and disorders depending on the family history and availability of laboratory testing at the time of the procedure. In comparison to amniocentesis (another type of prenatal test), CVS does not provide information on neural tube defects such as spina bifida. For this reason, women who undergo CVS also need a follow-up blood test between 16 to 18 weeks of their pregnancy, to screen for neural tube defects.[4]

Second Trimester Prenatal Screening Tests

Second trimester (13-26 weeks) prenatal screening may include several blood tests, called multiple markers. These markers provide information about a woman's risk of having a baby with certain genetic conditions or birth defects. Screening is usually performed by taking a sample of the mother's blood between the 15th and 20th weeks of pregnancy (16th to 18th is ideal). The multiple markers include:[4]

Alpha-fetoprotein (AFP) screening: This blood test measures the level of AFP in the mothers' blood during pregnancy. AFP is a protein normally produced by the fetal liver and is present in the fluid surrounding the fetus (amniotic fluid), and crosses the placenta into the mother's blood. The AFP blood test is also called MSAFP (maternal serum AFP). Abnormal test results of AFP and other markers may indicate the need for additional testing. Usually an ultrasound is performed to confirm the dates of the pregnancy and to look at the fetal spine and other body parts for defects. An amniocentesis may be needed for accurate diagnosis.[4]

Abnormal levels of AFP may signal the following:

- Open neural tube defects (ONTD), such as spina bifida
- Down syndrome
- Other chromosomal abnormalities
- Defects in the abdominal wall of the fetus
- Twins-more than one fetus is making the protein
- A miscalculated due date, as the levels vary throughout pregnancy

When a woman has both first and second trimester screening tests performed, the ability of the tests to detect an abnormality is greater than using just one screening independently. Nearly all cases of Down Syndrome can be detected when both first and second trimester screening are used.[4]

Inhibin A Hormone: This is a hormone produced by the placenta. In pre-eclampsia the maternal serum inhibin A level can be increased months before the onset of symptoms. Pre-eclampsia is a major cause of fetal and maternal morbidity, perinatal mortality and the main cause of maternal mortality. It usually presents clinically towards the end of pregnancy and after the disease process is well established. This provides an opportunity to study the early natural history of the disease and possibly to conduct treatment trials.[13]

Amniocentesis: An amniocentesis is a procedure used to obtain a small sample of the amniotic fluid that surrounds the fetus to diagnose chromosomal disorders and open neural tube defects (ONTDs), such as spina bifida. Testing is available for other genetic defects and disorders depending on the family history and availability of laboratory testing at the time of the procedure. An amniocentesis is generally offered to women between the 15th and 20th weeks of pregnancy who are at increased risk for chromosome abnormalities, such as women who are over age 35 years of age at delivery, or those who have had an abnormal maternal serum screening test, indicating an increased risk for a chromosomal abnormality or neural tube defect.[4]

Third Trimester Prenatal Screening Tests[4]

Human Chorionic Gonadotropin Hormone (hCG): hCG is a hormone produced by the placenta. Hormone levels during third-trimester pregnancy have not previously been systematically investigated. Recent data suggest that hCG may have a role as an endogenous tocolytic in normal pregnancy by directly promoting relaxation of uterine contractions.[12] Edelstam et al. in 2007 showed in their study a significant decrease in serum hCG level was found 2-3 weeks before the spontaneous start of labour. This might contribute to increasing the contractility in the uterine muscle and gradually initiate the onset of labour.[14]

Estriol: This is a hormone produced by the placenta. Estriol is the major estrogen in the pregnant female. Serial urine and blood studies of estriol excretion provide an objective assessment of placental function and fetal normality in high-risk pregnancies. Excretion of estriol increases around the eighth week of gestation and continues to rise until shortly before delivery. Estriol is produced in the placenta from estrogen precursors, which are made by the fetal adrenal gland and liver. The measurement of excreted estriol is an important index of fetal well-being. Rising values indicate an adequately functioning fetoplacental unit. Low levels may indicate Fetoplacental Deterioration (failing pregnancy, dysmaturity, preeclampsia/eclampsia, complicated diabetes mellitus, anencephaly, of fetal death) and require prompt reassessment of the pregnancy. If the estriol levels fall, early delivery of the fetus may be indicated.[15]

Serial studies usually begin at approximately 28 to 30 weeks of gestation and are then repeated weekly. The frequency of these estriol determinations can be increased as needed to evaluate a high-risk pregnancy. Collection may be done daily. Although the first collection is the baseline value, all collection results are compared with previous ones, because decreasing values suggest fetal deterioration. Some physicians use an average of three previous values as a control value.[15]

Estriol excretion studies can be done using 24-hour urine tests or blood studies. Because urinary creatinine excretion is relatively constant, creatinine clearance is often simultaneously tested to assess the adequacy of the 24-hour urine collection for estriol. A serially increasing estriol/creatinine ratio is a favorable sign in pregnancy.[15]

Rh antibody: If mother is Rh negative, her blood will be tested for Rh antibodies between 28 weeks and 29 weeks of pregnancy. If mother do not has Rh antibodies, she will receive Rh immunoglobulin. This shot

prevents mother from making antibodies during the rest of her pregnancy. If mother has Rh antibodies, she may need special care.[5]

RBS: Glucose screening test measures the level of glucose (sugar) in mother's blood. A high glucose level may be a sign of gestational diabetes. This test usually is done between 24 weeks and 28 weeks of pregnancy. If mother has risk factors for diabetes or had gestational diabetes in a previous pregnancy, screening may be done in the first trimester of pregnancy.[5]

The International Association of Diabetes and Pregnancy Study Groups (IADPSG) was formed in 1998 as an umbrella organization to facilitate collaboration between the various regional and national groups that have a primary or significant focus on diabetes and pregnancy.[16]

Group B Streptococcus (GBS): GBS is a type of bacteria that lives in the vagina and rectum. Many women carry GBS and do not have any symptoms. GBS can be passed to a fetus during birth. Most babies who get GBS from their mothers do not have any problems. A few, however, become sick. This illness can cause serious health problems and even death in newborn babies. GBS usually can be detected with a routine screening test that is given between 35 weeks and 37 weeks of pregnancy. For this test, a swab is used to take samples from the vagina and rectum. If the test result for GBS is positive, antibiotics can be given during labor to help prevent the baby from becoming infected.[1] Group B streptococcus (GBS) sepsis affects approximately 2 of every 1000 newborns. In an effort to decrease the incidence of neonatal GBS infection, the Centers for Disease Control and Prevention have established guidelines for screening and treatment during pregnancy.[17]

Screening tests are done during pregnancy to assess the risk that the fetus has certain common birth defects. A screening test cannot tell whether the fetus actually has a birth defect. There is no risk to the fetus with having screening tests.[5]

The aim of this study was to find out the scenario of screening regarding global recommended test parameters for mothers and outcomes.

II. Materials And Methods

Study design

The study was cross sectional and used diagnostic techniques to monitor the health of the pregnant women attending at the Urban Primary Health Care Services Delivery Project (UPHCSDP), Mirpur-1, Dhaka, Bangladesh.

Study Location

The study was conducted among the pregnant women at the Urban Primary Health Care Services Delivery Project (UPHCSDP) during February 2017 to April 2018. It is located at Mirpur-1, Dhaka, Bangladesh.

Study Sample

The study involved pregnant women attending prenatal screening and had been visiting the Urban Primary Health Care Services Delivery Project (UPHCSDP) during pregnancy.

Our target sample was 1000 pregnant women. Finally a total of 1000 pregnant women were selected from the Urban Primary Health Care Services Delivery Project (UPHCSDP) as study samples.

Hemoglobin Measurement

Sysmex analyzer XT-2000i uses the SLS detection method to measure the content of blood Hb. Sodium Lauryl Sulphate (SLS) is a surfactant which both lyses erythrocytes and rapidly forms a complex with the released hemoglobin. The product SLS-MetHb (Methemoglobin) is stable for a few hours and has a characteristic spectrum with maximum absorbance at 539 nm. The complex obeys Beer-Lambert's law so there is precise linear correlation between Hb concentration and absorbance of SLS-MetHb. The method simply involves mixing 25µL of blood with 5.0mL of a 2.08-mmol/L solution of SLS (buffered to pH of 7.2), and

reading absorbance at 539 nm. The results of ctHb (total hemoglobin concentration) by the SLS-Hb method have been shown to correlate very closely (r=0.998) with the reference HiCN (hemoglobincyanide) method. The method has been adapted for automated hematology analyzers and is as reliable in terms of both accuracy and precision as automated HiCN methods. A major advantage is that the reagent is non-toxic. It is also less prone to interference by lipemia and increased concentration of leukocytes. The long-term instability of SDS-MetHb precludes its use as a standard so the method must be calibrated with blood whose ctHb has been determined using the reference HiCN method.[18]

Random Blood Sugar (RBS) Measurement

For random blood sugar investigation blood was collected from a vein, typically from the inside of our elbow or from the back of our hand. This investigation was carried out by manual and automated methods. 2ml of Venus blood was collected into BD Vacutainer™ Plastic Blood Collection Tubes with a specific amount of Sodium Fluride/Na2 EDTA. Then wait for few minute. This blood sample was centrifuged for the separation of plasma from blood. Plasma was collected and put on the sample cup for test. For manual method 1 ml of (glucose oxide) sugar reagent was taken into a sample test tube and added 10µl blood plasma from the sample cup; and wait for 10 minutes. Absorbance was taken after 10 minutes by semi-auto analyzer. For automated method aliquot of the blood plasma in the sample cup was put into the analyzer to get the random blood sugar concentration.[18]

Treponema Pallidum Haemagglutination (TPHA) Test

The OnSite Syphilis Ab Combo Rapid Test (CTK Biotech, Inc. R0030C, USA) is a lateral flow chromatographic immunoassay. The test cassette consists of: 1) a burgundy colored conjugate pad containing recombinant Tp antigens conjugated with colloidal gold (Tp conjugates) and a control antibody conjugated with colloidal gold, 2) a nitrocellulose membrane strip containing a test line (T line) and a control line (C line). The T line is pre-coated with non-conjugated recombinant Tp antigens, and the C line is pre-coated with a control line antibody. We kept sample and test device at room temperature and on a clean , flat surface and wrote down ID number of patients. We dispensed 2 drop (about 60-90µL) of serum/plasma and1 drop (about 35-50µL) of Sample Diluent into the sample well making sure that there are no air bubbles. Then the specimen migrates by capillary action across the cassette. Anti-Tp antibody, if present in the specimen, will bind to the Tp conjugates. The immunocomplex is then captured on the membrane by the pre-coated Tp antigen forming a burgundy colored T line, indicating a Tp antibody positive test result. Absence of the T line suggests a negative result. The test contains an internal control (C line) which should exhibit a burgundy colored line of the immunocomplex of the control antibodies regardless of color development on the T line. If the C line does not develop, the test result is invalid, and the specimen must be retested with another device.

HBsAg Test

STANDARD Q HBsAg test (SD BIOSENSOR-QHBS01G, Korea) contains has two pre-coated lines, "C" (Control line) and "T" (Test line) on the surface of the nitrocellulose membrane. Both the control line and test line in the result window are not visible before applying any samples. Monoclonal anti-Chicken IgY is coated on the control line region and monoclonal anti-HBS is coated on the test line region. Monoclonal anti-HBS conjugated with colloidal gold particles is used as a detector for HBsAg. During the test, Hepatitis B surface antigen (HBsAg) in the sample interacts with anti-HBS conjugated with colloidal gold particles making antibody-antigen gold particle complex. This complex migrates on the membrane via capillary action until the test line, where it will be capture by monoclonal anti-HBS. We took 100µL sample (Serum) by a Micropipette (Germany), and transfer into the sample well of the test device. After 20 minutes and before 30 minutes, we took results. A violet test line would be visible in the result window if HBsAg present in the sample. The intensity of violet test line will vary depending upon the amount HBsAg present in the sample. If HBsAg is not present in the sample, then no color appears in the test line but color present in the Control line which referred to negative case. But if there were no any color both Control line and Test line, it referred to as an invalid test device. The control line is used for procedural control, and should always appear if the test procedure is performed properly and the test reagents of the control line are working.

Microscopic Examination of urine[19, 20]

- Urine was mixed thoroughly by rotating the container. About 10 ml of urine was poured off aseptically in a sterile labeled 15 ml conical centrifuge tube and was centrifuged for 10 minutes at 1500 rpm.
- Supernatant was poured off carefully into another tube.
- Sediment was remixed by tapping the bottom of the tube and then one drop of well mixed sediment was placed on a clean dry glass slide and was covered with a cover slip.

- The urine was then examined under microscope with 10 X objective to obtain an overall picture of the deposit and 40X objective was used to examine urine for pus cells, epithelial cells, RBC, casts, crystals etc. and was reported as follows:
- In urine sediment under 40X objective pus cells were reported as the number of pus cells/HPF. Pus cell 0-5/HPF was taken as test negative and Pus cell >5/HPF was taken as test positive.
- Epithelial cells were reported as number of epithelial cells/HPF.
- RBC were reported as number of RBC/HPF.
- Crystal were reported as few, moderate or many/HPF.
- Casts were reported as number of cast/LPF.

Statistical data analysis

All statistical analysis and other data processing were done by using IBM SPSS statistics 22. Data were analyzed in terms of frequency distribution, percentages to find out the association between selected variables.

III. Results

In our study 1000 pregnant woman were participated. These women were categorized into different age groups. Highest 36.9% pregnant women were found in 20-25years age group; and then follows 15-20 years (28.7%), 25-30 years (22.1%), 30-35 years (7.4%), 35-40 years (2.5%), 40-45 years (1.6%), 10-15 years (0.5%), 40-50 years (0.1%) and 50-55 years (0.1%) (Fig. 1).

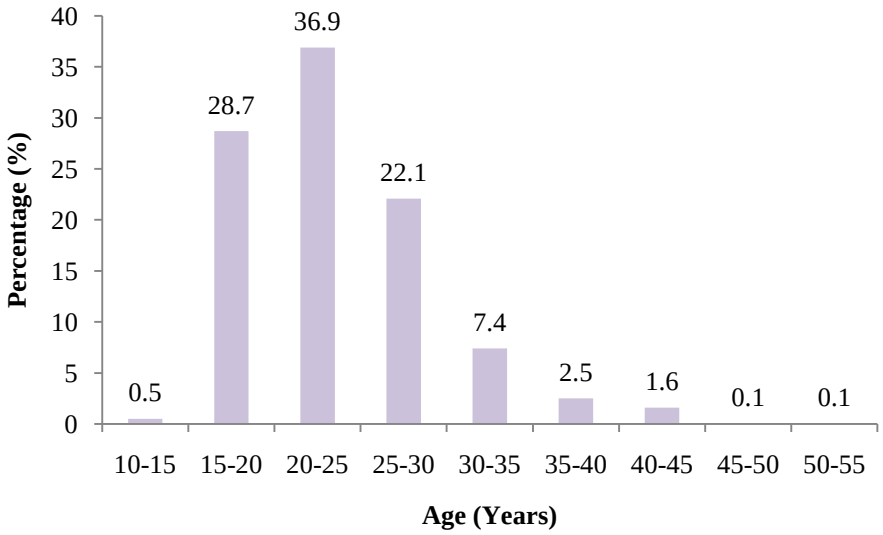

Fig. 1: Pregnancy spectrum in different age groups.

Participated 1000 pregnant women were allocated in different specific age. 14.3% pregnant women were found 20 years old; and then follows 25 years (9.8%), 22 years (9.6%), 23 years (7.1%), 30 years (6.3%), 19 years (6.1%), 26 years (5.7%), 18 years (5.5%), 5.2% for both 20 and 24 years, 27 years (4.7%), 28 years (3.3%), 29 years (2.1%), 17 years (2.0%), 34 years (1.5%), 1.4% for both 33 and 35 years, 36 years (0.9%), 16 years (0.8%), 31 years (0.7%), 0.5% for both 37 and 40 years, 0.4% for both 15 and 38 years, 0.3% for 42 and 44 years, 39 years (0.2%), 0.1% for 14, 43, 50 and 51 years old woman (Fig. 2).

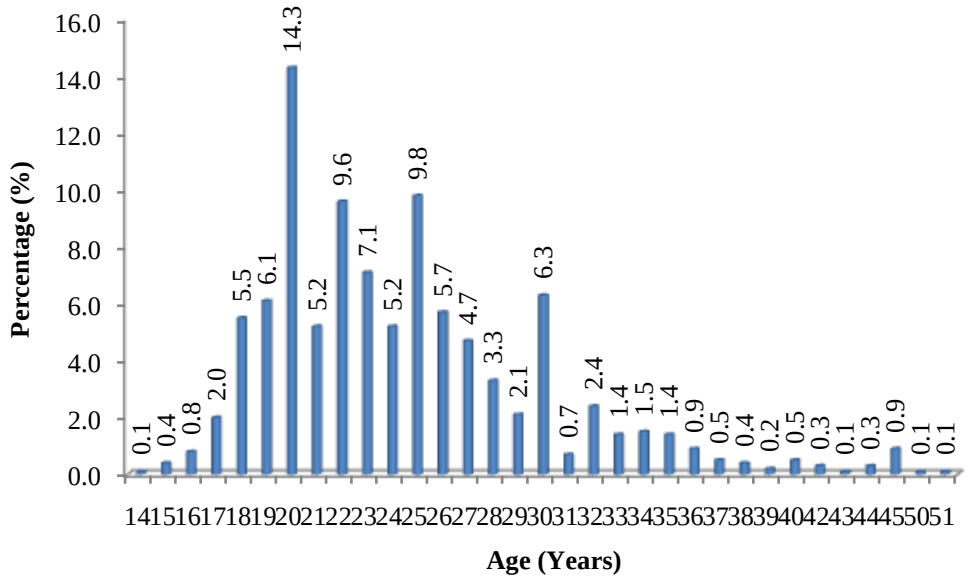

Fig. 2: Percentage distribution of pregnant woman in different age

Table-1 below presented that pregnant woman in the health check hospital of Dhaka, Bangladesh followed only hemoglobin, random blood sugar (RBS) screening, ultrasound examination, urinalysis (pus and epithelial cells count), HbsAg and VDRL test though we found many recommendations by U.S. National Library of Medicine (prenatal care).

Table 1: Prenatal screening tests in urban Bangladesh

Recommended Test[1, 10,11]	**Test Time**	**Prenatal Screening Tests in Urban Bangladesh**
First Trimester Prenatal Screening Tests (1-12weeks)		
Blood Test		
CBC Blood	Initial	X
Hb	Initial	√
Blood type	Initial	√
Rh type	Initial	X
HbsAg	Initial	√
hCG	11-14 weeks	X
PAPP-A	11-14 weeks	X
HCV	Initial	X
TB	Initial	X
Syphilis	Initial	√
Chlamydia	Initial	X
Gonorrhea	Optional	
AIDS	Optional	
Zika	Optional	
Toxoplasmosis	Optional	
Varicella	Optional	
Urine Test		
Urine culture	Initial	X
Routine Urinary Examination	Initial	Only pus and epithelial cell
Human chorionic gonadotropin (hCG)	9-13 weeks	X
Total protein		X
Albumin	11-13 weeks	X
RBS	8 weeks	√
Ultrasound Test		
Sonography	Within trimester	
Nuchal translucency (NT)	11-14 weeks	X
Doppler Ultrasound	Each trimester	X
Genetic Tests		
Tay-Sachs (Nerve cell destruction)	Optional	
Cystic fibrosis (Lung's disease)	Optional	
Sickle cell anemia	Optional	
Non-Invasive Prenatal Testing	After 10 weeks	

Second Trimester Prenatal Screening Tests (13-26 weeks)		
Alpha-fetoprotein screening (AFP)	15-20 weeks	X
Estriol	28-41 weeks	X
Inhibin-A Hormone	22 weeks	X
RBS	24-28 weeks	√
Amniocentesis	15-20 weeks (Optional)	X
Chorionic villus sampling (CVS)	16-18 weeks	X
Doppler Ultrasound	22 weeks	X
Sonography	18-20 weeks	
Third Trimester Prenatal Screening Tests (27 weeks-end of pregnancy)		
Rh antibody	28-29 weeks	X
hCG	Before 2-3 weeks	X
Group B streptococci (GBS)	35-37 weeks	X
Doppler Ultrasound	36-40 weeks	X
Sonography	After 30weeks	

Among 1000 pregnant women only 5.3% were found with standard Hb level. Sky high percentage (94.7%) of participants were observed with less than the standard concentration. No participant was found with more than the standard blood Hb limit (Fig. 3).

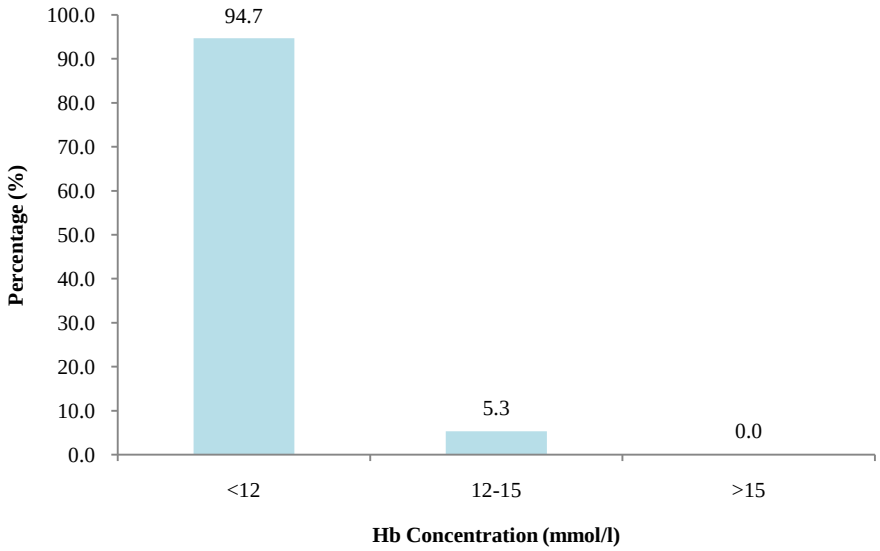

Fig. 3: Percentage distribution of pregnant woman in respect of different blood Hb levels

Regarding RBS concentration among 1000 pregnant women 83.1% were found with standard RBS level. 5.1% participants were observed with less than the standard concentration. 11.8% participants were found with more than the standard RBS limit (Fig. 4).

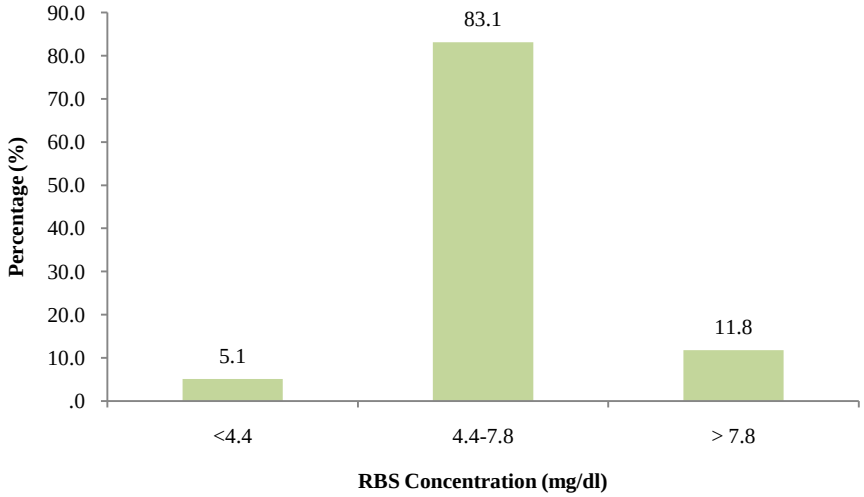

Fig. 4: Percentage distribution of pregnant woman regarding different RBS levels

During hepatitis B virus screening among 1000 pregnant women 24 (2.4%) of them were identified as infected for the presence of hepatitis B virus antigen (HBsAg) in their blood serum by ICT method. 97.6% (976) pregnant woman were found healthy regarding absence of HBsAg in their serum (Table-2).

Table-2: Prevalence of Hepatitis B Virus infection among pregnant woman

HBsAg Test		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	976	97.6	97.6	97.6
	Positive	24	2.4	2.4	100.0
	Total	1000	100.0	100.0	

ICT method used to screen syphilis disease among 1000 pregnant women. 1.1% (11) were screened out with positive antibody of Treponema pallidum bacteria that means syphilis and rest 98.9% (989) pregnant women were found free from syphilis (Table-3).

Table-3: Prevalence of sexually transmitted disease Syphilis caused Treponema pallidum bacterial infection among pregnant woman

VDRL Test		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	989	98.9	98.9	98.9
	Positive	11	1.1	1.1	100.0
	Total	1000	100.0	100.0	

23.4% (234) women among 1000 participants were observed with higher level of pus cells in the urine and 76.6% (766) women's pus cells count under microscope were within the standard limit (0-5 hpf) (Table-4

Table-4: Prevalence of pus cells in the urine among participated pregnant woman

Pus Cells		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 hpf	766	76.6	76.6	76.6
	>5 hpf	234	23.4	23.4	100.0
	Total	1000	100.0	100.0	

In respect of epithelial cells count 18.2% (182) women among 1000 participants were observed with higher level more than 0-5hpf in the urine and 81.8% (818) women's epithelial cells count under microscope were within the standard limit (0-5hpf) (Table-5).

Table-5: Prevalence of epithelial cells in the urine among participated pregnant woman

Epithelial Cells		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 hpf	818	81.8	81.8	81.8
	>5 hpf	182	18.2	18.2	100.0
	Total	1000	100.0	100.0	

IV. Discussion

In our study we found that pregnant woman in a government provided health service center of Dhaka, Bangladesh followed only hemoglobin, random blood sugar (RBS) screening, urinalysis (pus and epithelial cells count), HbsAg and VDRL test though we found many tests recommendations by U.S. National Library of Medicine (prenatal care).[1]

While pregnant women who have never had diabetes before but then develop high blood glucose levels may be diagnosed as having gestational diabetes,[21] according to the American Diabetes Association. It's when the blood glucose level (blood sugar) of the mother stays high (hyperglycemia) because she is unable to make and use all the insulin needed to support the demands of the pregnancy. About 18% of women may experience gestational diabetes while pregnant but only 7% of those pregnancies will face complications.[21] In our study we found 11.8% woman with more than the standard glucose level in blood.

Anemia is a major health problem that affects 25% to 50% of the population of the world and approximately 50% of pregnant women. Anemia in pregnancy is associated with increased rates of maternal and perinatal mortality, premature delivery, low birth weight, and other adverse outcomes.[21] Our study in a systematic review illustrated that the frequency of anemia in a health service center of Dhaka is 94.7 percent.

Vertical transmission of hepatitis B virus (HBV) from infected mothers to their neonates is one of the most important routes of infection. The exact prevalence rate of HBV in Iranian pregnant mothers is not well known but based on different studies it is estimated between 0.35% and 6.5%.[22] Our study found that 2.4% pregnant woman were identified as infected for the presence of hepatitis B virus antigen (HBsAg) in their blood serum.

In 2017, 1% or more of prenatal care attendees in 37 of 83 reporting countries were diagnosed with syphilis. Syphilis in pregnancy is the second leading cause of stillbirth globally and also results in, prematurity, low birthweight, neonatal death, and infections in newborns. These adverse outcomes can be prevented with a simple and inexpensive rapid test followed by treatment with benzathine penicillin.[23] 1.1% pregnant woman in a health service center of Dhaka were screened out with positive antibody of Treponema pallidum bacteria that means syphilis.

Urinary tract infection and its associated complications are the cause of nearly 150 million deaths per year worldwide. The disease can be developed in 40% - 50% of women and 5% of men. After anemia, UTIs are the second common complications in pregnant women, which if not controlled well, can adversely affect the health of infant or the pregnant mother. Pregnancy UTI is classified into two categories of symptomatic and asymptomatic: A) The involvement of the lower urinary tract, leading to asymptomatic bacteriuria is the most common cause of UTI during pregnancy. B) The involvement of the upper urinary tract can lead to symptomatic bacteriuria and is characterized by acute Pyelonephritis. Based on performed researches, the prevalence of symptomatic urinary tract infection in pregnant women has been 17.9% and asymptomatic form in 13%. If asymptomatic infection is not treated, it leads to some clinical manifestations in mother and newborn.[24] 23.4% women among 1000 participants were observed with higher level of pus cells in the urine and 18.2% women participants were observed with higher level of epithelial cells count. Pus and epithelial cells counts indicate UTI.

Every year, an estimated 7.9 million infants (6% of worldwide births) are born with serious birth defects. Although some congenital defects can be controlled and treated, an estimated 3.2 million of these children are disabled for life. Moreover, birth defects are the leading cause of infant mortality in the United States. But where do these defects come from? Although some birth defects are inherited, others are a product of harmful environmental factors known as teratogens, and still others are multifactorial, resulting from a complex interaction of genetic and environmental influences. However, in approximately half of all birth defect cases, the causes are unknown.[25]

Genetic causes of birth defects fall into three general categories: chromosomal abnormalities, single-gene defects, and multifactorial influences. Prenatal environment can play a major role in the development of defects in all three categories, especially those linked to multifactorial causes. Unfortunately no study found in Bangladesh to find out the prevalence of genetically defect babies.[25]

Ultrasound is a safe, painless and non-invasive procedure. Many parents consider the ultrasound as an opportunity to see their unborn child, and perhaps discover its sex. However, you should remember that the ultrasound is a diagnostic procedure and, in some cases, it may suggest that a fetus has an abnormality. Further

tests are usually needed to confirm the diagnosis.[26] In Bangladesh in early pregnancy, ultrasound is used to determine fetal age and viability. In the second and third trimesters, ultrasound is used to evaluate the fetus, monitor fetal growth and position, check amniotic fluid, survey the placental location etc.[27]

The South-East Asia region accounts for a disproportionately high number of global TB cases and Bangladesh is one of 22 'high TB-burden' countries. In 2014, there were 187,005 new cases of TB in Bangladesh and it was the leading cause of death, accounting for 81,000 fatalities.[28] No study found regarding the prevalence of TB among Bangladeshi pregnant woman.

V. Conclusion

Many prenatal diagnostic tests including TB, HIV, gonorrhea and genetical screening are escaped in urban Bangladesh. Several blood and urine tests are performed and they are useful for early intervention and management of vertical transmission of HBV and syphilis bacteria; and identification of gestational diabetes, anemia and UTI. Trimester based recommended diagnostic tests should be introduced timely and correctly to identify congenital defects and to find out abnormal biological parameters for the safety of fetal and maternal health.

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