

**Study on prevalence of pregnancy  
complications and patients' awareness at  
Dhaka city in Bangladesh**

**A dissertation submitted to Department of Pharmacy, East West  
University, in Partial fulfillment of the requirements for the Degree of  
Bachelor of Pharmacy (B. Pharm)**

**Submitted by**

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## **Declaration by the Candidate**

I hereby declare that this dissertation, entitled “**Study on prevalence of pregnancy complications and patient’s awareness at Dhaka city in Bangladesh**” is an authentic and genuine research work carried out by me under the guidance of Nishat Nasrin, Senior Lecturer, Department of Pharmacy, East West University, Dhaka.

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## **List of Abbreviation**

UNFPA - The United Nations Population Fund

WHO - World Health Organization

PIH - Pregnancy induced hypertension

ACOG - American Congress of Obstetricians and Gynecologists

HIV - Human immune deficiency virus

STIs - Sexually transmitted infections

HG - Hyperemesis gravidarum

HBV - Hepatitis B virus

GFR - Glomerular Filtration rate

DBP - Diastolic blood pressure

SBP - Systolic blood pressure

ADHD - Attention Deficit Hyperactivity Disorder

IDA - Iron deficiency anemia

UNIMAP - United Nations Multiple Micronutrient Preparation

UNICEF - United Nations Children's Fund

RNI - Recommended nutrient intake

TSH - Thyroid stimulating hormone

TPOAb - Thyroid peroxides antibody

CBC - Complete blood count

PPT - Postpartum thyroiditis

MDG - Millennium Development Goal

IUGR - Intra uterine growth retardation

GDM - Gestational diabetes mellitus

NIPORT - National Institute Of Population Research and Training

## **Abstract**

Complications during pregnancy are very much common in our country, but majority of the women do not have enough knowledge about this complications. So this current study was aimed to find out the prevalence of pregnancy related complications and patients' awareness about these complications at Dhaka city in Bangladesh. This was a survey based study where pregnant women from different hospital at Dhaka city were interviewed with a questionnaire. All the women in our study were in their third trimester of pregnancy. We have found 230 pregnant women with various complications among 300 sample population. Majority of the patients had hypertensive disorder (35%), anemia (26.33%). Some patients had UTI (4%), hepatitis (4%). We have found very insignificant amount of patients with diabetes and thyroid disorder. Among 230 patients with complications 18.66% had problems before their pregnancy and 76.66% had problem in their current pregnancy. The awareness level about these complications among the respondents was not satisfactory. In case of hypertensive disorder, the most practicing awareness factors were drinking sufficient water in a day, taking enough rest, taking prescribed medications. Majority of the anemic patients were aware about taking folic acid or vitamin B12, taking vitamin C containing foods or fruits and also taking the prescribed medication. Almost all the respondents learnt about these complications from their doctors. We have seen that many of them were not concern about taking proper antenatal or postnatal care. So there should be adequate steps in our country to make the women conscious about the total pregnancy period and also make the arrangements for practicing all the steps easily that will help the women to give birth their baby safely.

**Key words:** UTI, Hypertensive disorder, Antenatal care, Postnatal care

**CHAPTER 1**  
**INTRODUCTION**

## **1.1 Overview**

The state of motherhood is completed through giving birth of a child, so becoming a mother is one of the most exciting times in a woman's life. It comes true through the pregnancy period. So it can be said that Pregnancy – the nine months or so for which a woman carries a developing embryo and fetus in her womb – is for most women a time of great happiness and fulfillment (WHO, 2015). During pregnancy every mother must be very careful about her and babies health, it is called prenatal care of the baby and the mother. Studies have shown that mothers who have good prenatal care have the healthiest babies. They also have less chance of medical problems when they are pregnant. To take care of mother herself and her baby, consciousness about various factors is needed (Ferguson and Nokes, 2015).

## **1.2 Prenatal care**

### **1.2.1 Weight Gain**

All women gain a different amount of weight when they are pregnant. Gaining too little or too much weight is unhealthy for both mother and baby. To maintain an average weight, woman must follow a balanced healthy diet containing grains, vegetables, fruits, milk (Godfrey, 1996).

### **1.2.2 Calorie Needs**

Women do need to eat a bit more when they are pregnant, but eating for two does not mean that she should eat twice as much. During second and third trimester, mother should be eating about 300 more calories each day. That could be just two cups of low fat milk and one piece of fruit. Good food choices help to make sure that mother and baby are getting enough nutrients to grow on (Ahmed, 2012).

### **1.2.3 Protein**

Proteins are the building blocks of our cells. To get the protein mother should choose one of these types of protein-rich foods to eat each day like meat, poultry, fish, egg, yogurt, chess etc (Ahmed, 2012).



### **1.2.4 Folic Acid**

The US Public Health Service recommends that all women of childbearing age consume 400 micrograms (0.4 mg) of folic acid each day. Folic acid, a nutrient found in some green, leafy vegetables, most berries, nuts, beans, citrus fruits, fortified breakfast cereals, and some vitamin supplements can help reduce the risk of birth defects of the brain and spinal cord (called neural tube defects). The most common neural tube defect is spina bifida (in which the vertebrae do not fuse together properly, causing the spinal cord to be exposed) which can lead to varying degrees of paralysis, incontinence and sometimes mental retardation (Ramakrishnan *et al*, 1999).

### **1.2.5 Iron**

Iron is a vital part of mother blood. Iron is important during pregnancy because maternal body is making more blood for baby. The amount of iron in the food mother eats needs to double when she is pregnant, especially in the last half of pregnancy. Our bodies can use the iron in meat better than they can use the iron in vegetables, cereals and beans. To get enough iron, pregnant mother need at least one of these iron-rich foods each day:

- Red meats
- Liver
- Poultry (chicken, turkey and other birds)
- Beans
- Fortified cereals
- Green leafy vegetables such as spinach (Ramakrishnan *et al*, 1999).

### **1.2.6 Calcium**

Calcium is a major part of bone. Maternal body need calcium to help baby's bones grow. If the baby doesn't get enough calcium, baby will take calcium from mother bones. This can be one cause of osteoporosis (weak bones) when mother get older. So women need calcium more in the third trimester as it also helps to absorb dietary iron (Ramakrishnan *et al*, 1999).

### **1.2.7 Radiation**

If the mother needs an X-ray while she is pregnant, it must be made sure that the doctor, dentist or radiation technologist knows about the pregnancy or about the possibility of becoming pregnant. The greatest risk of radiation exposure is during the first trimester

(first 13 weeks) of pregnancy. High doses of radiation put developing babies at increased risk of poor growth, mental retardation, premature delivery or stillbirth. The doctor or nurse practitioner will carefully balance the need to have the X-ray with the possible risk to the baby (Harvey, 1985).

### **1.2.8 Caffeine**

There is caffeine in coffee, tea, chocolate, energy drinks and many kinds of soda. Most people eat or drink some caffeine. During pregnancy, it is wise to cut back on caffeine because it is a stimulant that affects how mother body works. If any woman drinks coffee when she is pregnant, decaffeinated coffee is best (Godfrey, 1996).

### **1.2.9 Rest and Sleep**

Women will usually be more tired and need extra sleep during the first trimester of pregnancy. Usually, by the second trimester, she won't be as tired. Being tired during pregnancy can be caused by not getting enough rest, not eating well, circulation problems, breathing problems, hormones, too much stress or poor posture. Some ways women can get enough rest and relaxation include:

- Getting eight hours or more sleep each night
- Taking time to take naps or rest periods during the day
- Trying to exercise on a regular basis
- Trying to drink warm milk to help sleeping
- Not to eat large meals, drinking anything with caffeine or using sleeping medicine late in the evening (Ferguson and Nokes, 2015).

### **1.2.10 Exercise**

Regular exercise will help prevent many common problems of pregnancy, such as constipation (inability to have a bowel movement) and lower backache. Most of the time, if any women already exercise regularly; it is good for her to continue (Gavard and Artal, 2008).

### **1.2.11 Medicines during pregnancy**

Most women are careful about taking medicine during pregnancy and rightly so. If the doctor or nurse practitioner recommends a vitamin or medicine for her during pregnancy, she will be told why it's needed, what will happen if she don't take it, how it will affect her and her baby and how and when to take the vitamin or medicine (Ferguson and Nokes ,2015).

### **1.2.12 Nausea Remedies**

Many women have problems with nausea (stomach upset) and vomiting during the early weeks of pregnancy. If nausea or vomiting is severe, doctor or nurse practitioner may recommend vitamin B6, doxylamine succinate (Unisom, Sleep-Aid), emetrol or other medications (Weigel and Weigel, 1989).

### **1.2.13 Increased Vaginal Discharge**

Increase of discharge from the vagina is caused by an increased production of hormones. With these hormones, the cervix makes more mucus and the cells lining the wall of the vagina make more fluid. This helps prevent infection. Even though this is a way of protecting the mother and the baby, these conditions may let germs that cause an infection grow in the vagina. This usually happens in the first trimester. Women should call doctor or nurse practitioner if she notices a bad smell, itching or a strange colored discharge from the vagina (Mitchell, 2004).

## **1.3 Pregnancy classification**

Pregnancy has a beginning, middle, and end - known as first, second, and third trimesters. These three trimesters have different emotional and physical happenings that make them unique. Like many English words, the word "trimester" has Latin origins. In this instance, trimester comes from the Latin word *trimestris*, which means *tri* (three) and *mensis* (month). Trimester is technically defined as a 3-month period that has origins related to menses and menstruation. The majority of health care providers determine trimesters under the guideline that a typical pregnancy lasts 40 weeks (280 days) starting from the first day of the last menstrual period. Using this method, each trimester is determined by dividing 40 weeks by 3.

**Table 1.1: Classification of pregnancy trimesters**

<b>Trimesters</b>	<b>Months</b>	<b>Weeks</b>
1 <sup>st</sup> trimester(weeks 1-13)	1	1-4
	2	5-8
	3	9-13
2 <sup>nd</sup> trimester(weeks 14-26)	4	14-17
	5	18-21
	6	22-26
3 <sup>rd</sup> trimester(weeks 27-40)	7	27-30
	8	31-35
	9	36-40

(Weiss, 1988)

#### **1.4 Changes in mother and the baby during trimesters**

Pregnancy is a period of considerable changes in a woman's body. These changes, affecting virtually every part of the body, are all geared towards growing and delivering a healthy baby, without harming the mother. Changes begin within days of conception when the fertilized egg implants itself in the wall of the uterus. The first changes are subtle, and most women will not notice them. However, some women claim that they were aware of their pregnancies within hours of conception. This chart describes a baby's development before birth and usual changes in a mother's body at different times during a baby's development. The baby will develop at about this rate, but probably not exactly the same (Ferguson and Nokes, 2015).

**Table 1.2: Development of mother and baby**

<b>Age</b>	<b>Baby's development</b>	<b>Mother's changes</b>
<b>8 Weeks</b>	About 1" long. Eyelids fused together. All major organs are formed.	Breast tingling and tenderness start around four to six weeks. Breasts increase in size by eight weeks.
<b>12 Weeks</b>	About 3"- 4" long. Teeth begin forming under the gums. Fingernails appear.	Uterus rises above the top of the pelvic bone. Nausea beginning to decrease.
<b>16 Weeks</b>	About 7"-8" long. Weighs about 3 oz.-4 oz. Eyes, ears, and nose are formed, giving face very human appearance. Baby's sex can be identified by ultrasound.	Growing uterus may cause feeling of stretching and pulling. Blood pressure may decrease slightly, heartbeat may increase. Skin changes associated with pregnancy may become noticeable.
<b>20 Weeks</b>	About 10" long and weighs nearly 10 oz. Develops hair on head, eyelashes and eyebrows. Begins to develop a sleep/wake schedule.	Most women able to feel baby move by now. Uterus has grown as high as the umbilicus (navel).
<b>24 weeks</b>	Weight 1½ lbs. Eyes open again. Begins breathing movements on own. If born now, may survive with very specialized care. May have lifelong problems.	Most women begin to "look pregnant" by this time. May begin to have problems with constipation. Some women notice colostrums leaking from the breast around this time.
<b>28 Weeks</b>	Weighs a little over 2 lbs. and is about 15" long. Lungs are mature enough now that, if born chances for survival are good, given specialized care (>80%).	May begin to notice very slight swelling in the ankles that goes down after resting. Problems with heartburn may increase.

<b>32 Weeks</b>	Weighs about 3 lbs. and is about 17" long. Sense of taste is developed. Skin is red and wrinkled.	May start to be aware of very mild, irregular "practice" contractions (Braxton Hicks). Need to urinate frequently.
<b>36 Weeks</b>	About 5 lbs. and 18" long. Chances for survival are very good. Some babies may require special care until lungs fully develop.	Changes in posture may cause problems with backache. Practice contractions may increase and cause "false labor".
<b>40 Weeks</b>	Weighs about 6-8 lbs. and is about 19"-21" long. Baby is fully formed and ready to be born.	Physical changes to support breast feeding are complete. Cervix soft and ready to dilate when regular contractions begin. May feel much pelvic pressure if baby is low in pelvis.

(Ferguson and Nokes, 2015)

### **1.5 Emotions of pregnant women**

Pregnancy and birth are major events in a woman life. It's perfectly normal to feel happy one minute and moody or sad the next. Current estimates of the prevalence of depression during pregnancy vary widely. A more precise estimate is required to identify the level of disease burden and develop strategies for managing depressive disorders (Bennett *et al.*, 2004). If one is concerned about feeling sad, should talk to her health care provider or get a referral to a mental health professional. Physical and emotional stresses are part of everyday life and are usually manageable. Many factors can contribute to stress in pregnancy such as the changes of body, possible changes in relationships with partner, co-workers, and family and financial concerns. It's possible that too much stress can contribute to prematurity and low birth weight of the baby. Learning to manage stress will help the mother and her partner avoid habits that can harm her and the baby, like drinking alcohol, smoking cigarettes, or using illicit drugs. Few ways to help the mother to handle stress in pregnancy (and parenthood) are:

- Recognizing the things that cause a mother stress and she should try to avoid them.
- Asking others to help her
- Taking a break - meditate, nap, do something fun, be physically active
- Talking the mother to someone - her partner, a friend, a health care provider.
- Setting her priorities carefully (Wisner, 1999).

Though pregnancy is generally a time of joy and well-being, complications can occur that cloud the experience and put the woman and her unborn child at risk (Derricott, 2014). Complications of pregnancy are health problems that occur during pregnancy. They can involve the mother's health, the baby's health, or both. Some women have health problems before they become pregnant that could lead to complications. Other problems arise during the pregnancy. Every day, 800 women die from complications of childbirth. Complications of pregnancy and childbirth are still the leading cause of death and disability among women of reproductive age in developing countries. A pregnant woman from a developing country is 36 times more likely to suffer from pregnancy-related complications compared with a pregnant woman from a developed country (Maine and Rosenfield, 1999).

This complications can arise any of either way such as before pregnancy, during pregnancy and various kinds of infection can also complicate the pregnancy.

## **1.6 Health conditions before pregnancy**

Before pregnancy, women should make sure to talk to her doctor about health problems she has that time or has had in the past. If she is receiving treatment for a health problem, her doctor might want to change the way her health problem is managed. Some medicines used to treat health problems could be harmful if taken during pregnancy. At the same time, stopping medicines that she need could be more harmful than the risks posed should she become pregnant. Be assured that the women are likely to have a normal, healthy baby when health problems are under control and she gets good prenatal care (Maine and Rosenfield, 1999).

### **1.6.1 Asthma**

Asthma is probably the most common potentially serious medical problem that occurs during pregnancy, and approximately 8% of pregnant women reported current asthma in

recent national surveys. In several studies, even after adjustment for potential confounders, women with asthma have been reported to have higher risks of several complications of pregnancy, including preeclampsia, preterm birth, infants with low birth weight or intrauterine growth restriction, infants with congenital malformations, and perinatal death than women without a history of asthma (Schatz, 2009). It will also cause preterm labour, hypertensive disorders of pregnancy, gestational diabetes, antepartum hemorrhage, infection of the amniotic cavity, premature rupture of membrane, cesarean delivery, as well as postpartum hemorrhage (Wen, 2015).

### **1.6.2 Depression**

According to The American Congress of Obstetricians and Gynecologists (ACOG), between 14-23% of women will struggle with some symptoms of depression during pregnancy. Common symptoms of depression (sleep, energy and appetite change) may be misinterpreted as normative experiences of pregnancy. Treatment engagement is important as untreated depression during pregnancy may have unfavorable outcomes for both women and children. Complications of pregnancy associated with depression include inadequate weight gain, under utilization of prenatal care, increased substance use, and premature birth (Lee *et al.*, 2007).

### **1.5.3 Diabetes**

Diabetes in pregnancy is increasing and therefore it is important to raise awareness of the associated health risks to the mother, the growing fetus, and the future child. Perinatal mortality and morbidity is increased in diabetic pregnancies through increased stillbirths and congenital malformation rates. These are mainly the result of early fetal exposure to maternal hyperglycemia. In the mother, pregnancy may lead to worsening or development of diabetic complications such as retinopathy, nephropathy, and hypoglycemia (Ali and Dornhorst, 2011).

### **1.6.4 Eating disorders**

Women with anorexia nervosa are underweight and may not gain enough weight during pregnancy. They risk having a baby with abnormally low birth weight and related health problems. Women with bulimia nervosa who continue to purge may suffer dehydration, chemical imbalances or even cardiac irregularities. Pregnancy heightens these health



risks. Women who are overweight due to binge eating are at greater risk of developing high blood pressure, and gestational diabetes (Lemberg and Phillips, 1989). Poor development, premature birth, low birth weight for age, respiratory distress, feeding difficulties, and other perinatal complications can arise from this (Kouba, 2005).

### **1.6.5 Epilepsy and other seizure disorders**

Seizures during pregnancy can harm the fetus, and increase the risk of miscarriage or stillbirth. Anti epileptic drugs may increase the risk of physical defects such as spina bifida, heart abnormalities and cleft lip. Other abnormalities can be caused such as lower intellectual ability of poor language skills (speaking and understandings), memory problems to the baby. For most pregnant women with epilepsy, using medicine poses less risk to their own health and the health of their babies than stopping medicine (Rosa, 1991).

### **1.6.6 High blood pressure**

High blood pressure during pregnancy can place extra stress on women heart and kidneys and can increase the risk of heart disease, kidney disease, and stroke. Other possible complications include the following:

- **Placental abruption**—this condition, in which the placenta prematurely detaches from the wall of the uterus, is a medical emergency that requires immediate treatment (Granger, 2001).
- **Fetal growth restriction**—High blood pressure can decrease the flow of nutrients to the baby through the placenta. The baby may have growth problems as a result (Granger, 2001).
- **Preterm delivery**—if the placenta is not providing enough nutrients and oxygen to the baby, it may be decided that early delivery is better for baby than allowing the pregnancy to continue (Granger, 2001).
- **Cesarean delivery**—Women with hypertension are more likely to have a cesarean delivery than women with normal blood pressure. A cesarean delivery carries risks of infection, injury to internal organs, and bleeding (Granger, 2001).
- **Preeclampsia**— this condition is more likely to occur in women with chronic high blood pressure than in women with normal blood pressure (Magee, 1999).

### **1.6.7 HIV**

HIV can be passed from a woman to her baby during pregnancy, labor and delivery, or breastfeeding are the most common route of HIV infection in children. When HIV is diagnosed before or during pregnancy, perinatal transmission can be reduced to less than 1% if appropriate medical treatment is given, the virus becomes undetectable, and breastfeeding is avoided (Townsend *et al.*, 2008)

### **1.6.8 Sexually transmitted infections (STIs)**

Some STIs can cause early labor, a woman's water to break too early, and infection in the uterus after birth. Some STIs also can be passed from a woman to her baby during pregnancy or delivery. Some ways STIs can harm the baby include: low birth weight, dangerous infections, brain damage, blindness, deafness, liver problems, or stillbirth (Mor and Cardenas, 2010).

## **1.7 Problems during pregnancy**

Sometimes pregnancy problems arise even in healthy women. Some prenatal tests done during pregnancy can help prevent these problems or spot them early. If a problem is found, patient must follow doctor's advice about treatment. Doing so will boost patient chances of having a safe delivery and a strong, healthy baby.

### **1.7.1 Anemia**

Anemia is when the patient does not have enough healthy red blood cells to carry oxygen to the rest of the body. Without enough oxygen, the body cannot work as well as it should, and so the patient feels tired and run down. In pregnancy, iron deficiency has been linked to an increased risk of premature birth and low birth weight. Premature birth is birth before 37 weeks of pregnancy. Low birth weight is when a baby weighs less than 5 pounds, 8 ounces at birth (Benoist, 2005).

### **Symptoms**

- Fatigue (very common)
- Cold hands and feet
- Feeling tired or weak

- Looking pale
- Feeling faint
- Shortness of breath (Benoist,2005)

## **Treatment**

Women with pregnancy related anemia are helped by taking iron and folic acid supplements. Patient's doctor will check iron levels throughout pregnancy to be sure anemia does not happen again (Benoist, 2005).

### **1.7.2 Ectopic pregnancy**

In most pregnancies, the fertilized egg travels through the fallopian tube to the womb (uterus). If the movement of the egg is blocked or slowed through the tubes, it can lead to an ectopic pregnancy. The most common site for an ectopic pregnancy is within one of the two fallopian tubes. In rare cases, ectopic pregnancies can occur in the ovary, abdomen, or cervix. Things that may cause this problem include:

- Birth defect in the fallopian tubes
- Scarring after a ruptured appendix
- Endometriosis
- Having had a previous ectopic pregnancy
- Scarring from past infections or surgery of the female organs (Bouyer, 2003)

## **Symptoms**

- Feeling dizzy or faint
- Shoulder pain
- Vaginal bleeding
- Abdominal pain (Bouyer, 2003)

## **Treatment**

Current therapeutic options for an ectopic pregnancy are expectant management, systemic methotrexate injections, sonographically guided minimal invasive treatment, and surgery (Vandana and Debora, 2004).

### **1.7.3 High blood pressure**

High blood pressure during pregnancy can place extra stress on women heart and kidneys and can increase the risk of heart disease, kidney disease, and stroke (Granger, 2001).

#### **Symptoms**

- Nausea that does not go away
- Vomiting several times every day
- Weight loss
- Reduced appetite
- Dehydration
- Feeling faint or fainting

#### **Treatment**

The health of the mother and baby are closely watched to make sure high blood pressure is not preeclampsia and necessary steps to control the blood pressure (Lowe, 2014).

### **1.7.4 Hyperemesis gravidarum (HG)**

Hyperemesis gravidarum (HG) is a condition causing severe nausea and vomiting in early pregnancy often resulting in hospital admission. The incidence of HG is approximately 0.5% of live births, said to be higher in multiple pregnancies, hydatidiform mole and other conditions associated with increased pregnancy hormone levels (Verberg, 2005). HG can lead to an increased risk of low birth weight, preterm birth. Moreover, HG affects a woman's quality of life and daily functioning, and is the most common reason for hospitalization during early pregnancy (Vikanes, 2008).

#### **Symptoms**

- Nausea that does not go away
- Vomiting several times every day
- Weight loss
- Reduced appetite

## **Treatment**

Dry, bland foods and fluids together is the first line of treatment. Sometimes, medicines are prescribed to help nausea. Many women with HG have to be hospitalized so they can be fed fluids and nutrients through a tube in their veins. Usually, women with HG begin to feel better by the 20th week of pregnancy. But some women vomit and feel nauseated throughout all three trimesters (Vikanes , 2008).

### **1.7.5 Miscarriage**

Pregnancy loss from natural causes before 20 weeks. Pregnancies end in miscarriage.

## **Symptoms**

- Vaginal spotting or bleeding
- Cramping or abdominal pain
- Fluid or tissue passing from vagina

## **Treatment**

In most cases, miscarriage cannot be prevented. Sometimes, a woman must undergo treatment to remove pregnancy tissue in the uterus. Counseling can help with emotional healing (Ngai, 2001).

### **1.7.6 Placental abruption**

Placental abruption complicates about 1% of pregnancies and is a leading cause of vaginal bleeding in the latter half of pregnancy. It is also an important cause of perinatal mortality and morbidity. The maternal effect of abruption depends primarily on its severity, whereas its effect on the fetus is determined both by its severity and the gestational age at which it occurs. Risk factors for abruption include prior abruption, smoking, trauma, cocaine use, multifetal gestation, hypertension, preeclampsia, thrombophilias, advanced maternal age, preterm premature rupture of the membranes, intrauterine infections, and hydramnios. Abruption involving more than 50% of the placenta is frequently associated with fetal death (Oyelese and Ananth, 2006).

## **Symptoms**

- Vaginal bleeding
- Cramping, abdominal pain, and uterine tenderness

## **Treatment**

When the separation is minor, bed rest for a few days usually stops the bleeding. Moderate cases may require complete bed rest. Severe cases (when more than half of the placenta separates) can require immediate medical attention and early delivery of the baby (Ananth, 2004).

### **1.7.7 Preeclampsia**

It is identified by a blood pressure that is greater than or equal to 140/90 mm Hg in the presence of protein in the urine (proteinuria).

## **Symptoms**

- High blood pressure
- Swelling of hands and face
- Too much protein in urine
- Stomach pain
- Blurred vision
- Dizziness
- Headaches

## **Treatment**

The only cure is delivery, which may not be best for the baby. Labor will probably be induced if condition is mild and the woman is near term (37 to 40 weeks of pregnancy). If it is too early to deliver, the doctor will watch the health of the mother and her baby very closely. She may need medicines and bed rest at home or in the hospital to lower her blood pressure. Medicines also might be used to prevent the mother from having seizures (Brewer and Hodin, 1978).

### **1.7.8 Preterm labor**

The definition of spontaneous preterm labour is the labour resulting in birth before 37 completed weeks (259 days) of gestational age. Although the definition of preterm birth is birth before 37 completed weeks, the major transition in terms of needing special care occurs between 34 and 37 weeks. There are no accurate recent worldwide data, but estimates of preterm birth rates range from 5% in developed countries to 25% in developing countries. The preterm delivery rate has been relatively stable at 5–10% in developed countries for many years (WHO, 1977).

#### **Symptoms**

- Increased vaginal discharge
- Pelvic pressure and cramping
- Back pain radiating to the abdomen
- Contractions (Dyson, 1998)

#### **Treatment**

Women can do the home monitoring and can take drug to avoid this (Dyson, 1998).

### **1.7.9 Hepatitis B virus (HBV)**

Perinatal transmission of hepatitis B (HB) virus occurs if the mother has had acute HB infection during late pregnancy or in the first months postpartum, or if the mother is a chronic HB antigen carrier. Vertical transmission from chronic carriers exceeds 90% and accounts for up to 40% of the world chronic carriers in endemic areas. Newborns that get infected have a 90 percent chance of developing lifelong infection. This can lead to liver damage and liver cancer. A vaccine can keep newborns from getting HBV. But 1 in 5 newborns of mothers who are HBV positive do not get the vaccine at the hospital before leaving (Jonas, 2009).

#### **Treatment**

Lab tests can find out if the mother is a carrier of hepatitis B.

Protection of the baby from HBV with the hepatitis B vaccine, which is a series of three shots:

- First dose of hepatitis B vaccine plus HBIG shot given to baby at birth

- Second dose of hepatitis B vaccine given to baby at 1-2 months old

Third dose of hepatitis B vaccine given to baby at 6 months old (but not before 24 weeks old) (Jonas, 2009).

## **1.8 Major complications during pregnancy**

Among all this above problems, we try to focus on five major complications in our research that really complicate the pregnancy period of a woman. These complications are:

### **1.8.1 Hypertension**

Pregnancy induced hypertension is the most common complication of pregnancy, remains a major source of maternal-child morbidity and mortality (Innes and Wimsatt, 1999). PIH is defined as hypertension (blood pressure  $\geq 140/90$  mmHg) with or without proteinuria ( $\geq 300$  mg/24 hours) emerging after 20 weeks gestation, but resolving up to 12 weeks postpartum. PIH is also defined as new onset proteinuria ( $\geq 300$  mg/24 hours) in hypertensive women who exhibit no proteinuria before 20 weeks gestation (Watanabe et al., 2013). Despite being the leading cause of maternal death and a major contributor of maternal and perinatal morbidity, the mechanisms responsible for the pathogenesis of PIH have not yet been fully elucidated (Granger, 2001). Hypertension in pregnancy is not a single entity but comprises:

- Chronic hypertension, which complicates 1%-5% of pregnancies and is defined as a blood pressure greater than 140/90 mm Hg that either predates pregnancy or develops before 20 weeks of gestation.
- Pregnancy induced hypertension, which develops after 20 weeks of gestation and complicates 5%-10% of pregnancies.
- Gestational hypertension, which is pregnancy induced hypertension in isolation; it may reflect a familial predisposition to chronic hypertension, or it may be an early manifestation of pre-eclampsia.
- Pre-eclampsia, which is pregnancy induced hypertension in association with proteinuria or oedema, or both, and virtually any organ system may be affected ( Magee, 1999).



### **1.8.1.1 Classification**

This classification of the hypertensive disorders in pregnancy reflects the pathophysiology of the constituent conditions as well as the risks and potential outcomes for both mother and baby (Lowe, 2014).

#### **Gestational hypertension (GH)**

GH is diagnosed in women whose blood pressure reaches  $\geq 140/90$  mmHg for the first time during pregnancy (after 20 weeks gestation), but without proteinuria. Blood pressure normalizes by 12 weeks postpartum.

#### **Preeclampsia (PE)**

Hypertension (blood pressure  $\geq 140/90$  mmHg) accompanied with proteinuria exceeding 300 mg/24 hours emerges for the first time after 20 weeks gestation, but both symptoms normalize by 12 weeks postpartum.

#### **Superimposed preeclampsia (S-PE)**

Superimposed preeclampsia is diagnosed in the following three cases.

- ✓ New onset proteinuria ( $\geq 300$  mg/24 hours) in hypertensive women who exhibit no proteinuria before 20 weeks gestation.
- ✓ Hypertension and proteinuria documented antecedent to pregnancy and/or detected before 20 weeks gestation, one or both of which progressing after 20 weeks gestation.
- ✓ Renal disease with proteinuria documented antecedent to pregnancy and/or detected before 20 weeks gestation, which is accompanied with new onset hypertension after 20 weeks gestation (Watanabe, 2013).

#### **Eclampsia (E)**

Eclampsia is defined as the onset of convulsions in a woman with PIH that cannot be attributed to other causes. The seizures are generalized and may appear before, during, or after labor.

### **1.8.1.2 Classification by onset**

PIH that emerges earlier than 32 weeks gestation is referred to as early onset (EO) type, and pregnancy induce hypertension( PIH) that emerges after 32 weeks gestation is referred to as late onset (LO) type (Watanabe, 2013).

### **1.8.1.3 Risk factors**

1. Maternal age over 40.
2. Complications of hypertension, renal disease, diabetes mellitus, and obesity.
3. Family history of PIH, hypertension (most important), and diabetes mellitus type 2
4. Nulliparity.
5. Past history of PIH.
6. More than 5 years since the last gestation.
7. Multiple pregnancies.
8. Maternal blood pressure of  $\geq 130$  mmHg and  $\geq 80$  mmHg for systolic and diastolic pressures, or a mean arterial pressure of  $\geq 90$  mmHg in the first trimester of pregnancy.
9. Periodontal disease (Naruse, 2013).

### **1.8.1.4 Effect on fetal body**

Nearly one- third of pregnancies with hypertensive diseases are affected by growth restriction as a result of chronic hypoxia. The chronic hypoxia also lead to poor fetal reserves and high chances of abnormal fetal heart rate pattern, meconium stained amniotic fluid and other poor outcomes in labor. Two other events that need to be predicted are less common but have more severe implications i.e. abruption and fetal death. The onset before 28 weeks of pregnancy is associated with a 27% risk of growth restriction, while the risk falls to 9% if the onset is after 32 weeks of pregnancy. If the period of gestation is remote from term, the fetus is faced with the risk of prematurity. This could be a significant burden depending on the period of gestation. An earlier period of gestation indicates a higher risk of all prematurity related complications such as respiratory distress, intra ventricular hemorrhage, metabolic disturbances and sepsis (Arulkumaran, 2013).

### **1.8.1.5 Treatment**

Sudden and severe increases in blood pressure may be the presenting feature of hypertensive disease in pregnancy, intrapartum or in the postnatal period. Blood pressure greater than or equal to 170mmHg systolic or 110mmHg diastolic constitute severe hypertension requiring urgent treatment. A variety of medications have been used for the treatment of severe hypertension in pregnancy. There is concern that a precipitous fall in blood pressure after antihypertensive treatment, particularly intravenous hydralazine, may impair placental perfusion resulting in fetal distress. This can be prevented by co-administration of a small bolus of fluid e.g. normal saline 250mL, at the time of administration of antihypertensive therapy. Continuous cardiotocography (CTG) monitoring should be considered in these situations, particularly when there is evidence of existing fetal compromise. However, fetal distress as a result of such treatment is rare. The concurrent administration of longer acting oral agent will achieve a more sustained blood pressure lowering effect (Lowe, 2014).

### **1.8.2 Preeclampsia**

Preeclampsia (also called toxemia) is a serious disorder that generally develops after 20 weeks of pregnancy and is marked by high blood pressure and high levels of protein in the urine. It is identified by a blood pressure that is greater than or equal to 140/90 mm Hg in the presence of protein in the urine (proteinuria). Preeclampsia is indicated when there is a finding of 300 mg of protein in a 24-hour urine test or 1–2+ protein or greater via urine dipstick (Derricott, 2014). It complicates 5 to 8 percent of all pregnancies, according to the Preeclampsia Foundation (Brewer and Hodin, 1978).

#### **1.8.2.1 Complications**

Preeclampsia with dangerously high blood pressure and high levels of protein in the urine (a sign of kidney problems), is also associated with several other complications if left untreated, including:

- Pre-eclampsia is associated with abnormal placentation. The abnormalities may be related to the nitric oxide pathway, which contributes substantially to the control of vascular tone. Moreover, inhibition of maternal synthesis of nitric oxide prevents embryo implantation. Increased uterine arterial resistance induces higher sensitivity to vasoconstriction and thus chronic placental ischemia and oxidative

stress. This chronic placental ischemia causes fetal complications, including intrauterine growth retardation and intrauterine death (Ayoubi, 2011).

- Oxidative stress induced by preeclampsia release into the maternal circulation of substances such as free radicals, oxidized lipids, cytokines, and serum soluble vascular endothelial growth factor. These are responsible for endothelial dysfunction with vascular hyper permeability, thrombophilia, and hypertension, so as to compensate for the decreased flow in the uterine arteries due to peripheral vasoconstriction (Roberts, 1998). Endothelial dysfunction is responsible for the clinical signs observed in the mother, ie, impairment of the hepatic endothelium contributing to onset of the HELLP (Hemolysis, Elevated Liver enzymes and Low Platelet count) syndrome, impairment of the cerebral endothelium inducing refractory neurological disorders, or even eclampsia and also a low birth weight baby (under 5.5 pounds) (Ayoubi, 2011).
- Abnormal liver function tests
- Seizures
- Preterm delivery (delivering before 37 weeks)
- Stroke
- Kidney failure
- Transient (not permanent) loss of vision
- Rupture of the liver
- Maternal and/or fetal death (rare) (Brewer and Hodin, 1978).

### **1.8.2.2 Risk factors**

Although there are risk factors for preeclampsia, it's possible for any pregnant woman to develop the condition:

- A personal or family history of preeclampsia
- A first pregnancy
- Being in teens or over the age of 40
- Being pregnant with multiples
- High blood pressure
- Obesity (a body mass index over 30)
- Diabetes
- Nulliparity (Ayoubi, 2011).

### **1.8.2.3 Symptoms**

#### **Early symptoms**

Pregnant women with pre-eclampsia develop the following symptoms first:

- high blood pressure (hypertension)
- proteinuria (protein in the urine).

The patient probably won't notice these symptoms, but her doctor or midwife should pick them up during her antenatal appointments.

#### **Progressive symptoms**

As pre-eclampsia develops, it can cause fluid retention (oedema), which often causes sudden swelling of the feet, ankles, face and hands.

Oedema is another common symptom of pregnancy, but it tends to be in the lower parts of the body, such as the feet and ankles. It will gradually build up during the day. If the swelling is sudden, and it particularly affects the face and hands, it could be pre-eclampsia. Some others are,

- Severe headache
- Visual disturbances such as flashing lights or blurred vision
- Pain in the upper right area of abdomen and/or shoulder pain
- Pain or a burning sensation behind sternum
- Nausea or vomiting
- Confusion or anxiety
- Shortness of breath (Brewer and Hodin, 1978).

### **1.8.2.4 Diagnosis**

Diagnosis of preeclampsia can be done in two ways:

#### **Clinical Assessment**

The hallmark features in preeclampsia include developing systolic blood pressure (SBP)  $\geq 140$ , or diastolic blood pressure (DBP)  $\geq 90$ , and proteinuria of 0.3 grams or greater in a 24-hour urine specimen after 20 weeks of gestation in a woman who was previously normotensive. Hypertension is generally the earliest physical abnormality seen in preeclampsia and is the most important clinical clue to the presence of the disease. Since

SBP and DBP readings are an essential part of the diagnosis of preeclampsia, ensuring that the optimal and appropriate ways are employed to measure BP cannot be overemphasized (Mustafa, 2012).

## **Laboratory Tests**

### **❖ Proteinuria**

Although proteinuria is generally considered an essential characteristic of preeclampsia, preeclampsia should be suspected in any pregnant woman with hypertension and characteristic signs or symptoms, even if proteinuria is absent. Twenty percent of women who develop eclampsia have no proteinuria and 10 percent of women with other clinical and/or histological manifestations of preeclampsia have no proteinuria. Women with proteinuria detected by urine dipstick should undergo quantitative measurement of protein excretion. Use of the urine protein: creatinine (P: C) ratio to estimate 24 h protein excretion for the diagnosis of preeclampsia (Robert, 1997).

### **❖ Kidney Function**

The kidney is the organ most likely to manifest endothelial injury related to preeclampsia. Although the plasma creatinine concentration is generally normal or only slightly elevated (1.0 to 1.5 mg/dL (88 to 133 mmol/L)), this could represent a decrease by 30–40% of glomerular filtration rate (GFR) for the values experienced in pregnant normotensive controls. Renal failure is an unusual complication that most often occurs in patients who develop severe preeclampsia. Distinguishing preeclampsia from an exacerbation of underlying renal disease can be challenging. This is especially true in patients with preexisting proteinuria because protein excretion almost always increases as pregnancy progresses. Preexisting renal disease is a well-described risk factor for preeclampsia, and the onset of preeclampsia in early pregnancy (before 32 weeks) is most often seen in patients with underlying kidney disease or hypertension (Ayoubi, 2011).

## **1.8.2.5 Treatment**

The only cure for preeclampsia is to deliver the baby, but the doctor will develop a treatment plan that takes patient's specific case into account. For mild preeclampsia that begins before the baby is full-term (37 weeks) "the typical treatment is admission to the

hospital, with modified bed rest, low stimulation, fetal monitoring, and blood and urine tests," says Chad Klauser, M.D., a perinatologist and clinical assistant professor at the Mt. Sinai School of Medicine in New York City. Steroid treatments can help the baby's lungs develop. If the patient remains stable, she may be able to wait to deliver until she is full-term. If patient's preeclampsia is severe, she will probably be delivered within a few days just long enough for the steroids to help her baby (Brewer and Hodin, 1978).

#### **1.8.2.6 Prevention**

- In areas where dietary calcium intake is low, calcium supplementation during pregnancy (at doses of 1.5–2.0 g elemental calcium/day) is recommended for the prevention of pre-eclampsia in all women, but especially those at high risk of developing pre-eclampsia.
- Low-dose acetylsalicylic acid (aspirin, 75 mg) is recommended for the prevention of pre-eclampsia in women at high risk of developing the condition.
- Low-dose acetylsalicylic acid (aspirin, 75 mg) for the prevention of pre-eclampsia and its related complications should be initiated before 20 weeks of pregnancy.
- Women with severe hypertension during pregnancy should receive treatment with antihypertensive drugs.
- Advice to rest at home is not recommended as an intervention for the primary prevention of pre-eclampsia and hypertensive disorders of pregnancy in women considered to be at risk of developing those conditions.
- Strict bedrest is not recommended for improving pregnancy outcomes in women with hypertension (with or without proteinuria) in pregnancy.
- Restriction in dietary salt intake during pregnancy with the aim of preventing the development of pre-eclampsia and its complications is not recommended.
- Vitamin D supplementation during pregnancy is not recommended to prevent the development of pre-eclampsia and its complications.
- Individual or combined vitamin C and vitamin supplementation during pregnancy is not recommended to prevent the development of pre-eclampsia and its complications.

- Diuretics, particularly thiazides, are not recommended for the prevention of pre-eclampsia and its complications (WHO, 2015).

### **1.8.3 Gestational diabetes**

Gestational diabetes, or diabetes that is diagnosed during pregnancy in a woman who previously did not have diabetes, occurs when the pancreas fails to produce enough insulin to regulate blood sugar efficiently. "A hormone produced by the placenta makes a woman essentially resistant to her own insulin," Dr. Devine explains. For years, doctors believed that affected three to five percent of all pregnancies, but new, more rigorous diagnostic criteria puts the number closer to 18 percent. The condition, which can strike any pregnant woman, usually develops in the second trimester, between weeks 24 and 28, and typically resolves after baby is born. If gestational diabetes is treated and well-managed throughout the pregnancy, "There's no reason you can't deliver a very healthy baby," says Patricia Devine, M.D., perinatologist at New York-Presbyterian Hospital in New York City. But gestational diabetes that goes untreated, or isn't carefully monitored, can be harmful for both mother and baby. If one's had gestational diabetes in a previous pregnancy, she has a 60 percent chance of developing it again, according to the American Diabetes Association. Additionally, half of all women with a history of gestational diabetes develop type 2 diabetes within 10 years of the onset of their gestational diabetes, so it's important to maintain good exercise and nutritional habits after the baby is born (Dashiell, 2015).

#### **1.8.3.1 Risk factors**

Although the condition can strike any pregnant woman, there are several factors that could increase the chances of developing it. Risk factors include:

- Age greater than 25
- Family history of diabetes
- Obesity prior to pregnancy
- History of birthing big babies (over 9 pounds)
- High blood pressure
- Excess amniotic fluid (called polyhydramnios)
- History of unexplained miscarriage or stillbirth
- Personal history of gestation diabetes (Dashiell, 2015).



### 1.8.3.2 Complications

Antepartum morbidity in women with gestational diabetes is limited to an increased frequency of hypertensive disorders. The data are most convincing for an association with preeclampsia and more controversial for an association with pregnancy-induced hypertension. Careful monitoring of blood pressure, weight gain, and urinary protein excretion is recommended, particularly during the second half of gestation. Standard diagnostic criteria and treatment of hypertensive disorders are applicable to women with gestational diabetes. Stillbirth is an important complication of diabetic pregnancies, including pregnancies in women with untreated gestational diabetes. As a result, maternal monitoring of fetal movements and fetal cardiotocography are often recommended in pregnancies complicated by gestational diabetes in order to detect fetuses at risk of intrauterine death. Women with gestational diabetes and otherwise uncomplicated pregnancies who were treated by diet or at 32 to 34 weeks of gestation in women treated with insulin, women with hypertension, and women who had had a previous stillborn infant (Sermer, 1998). Macrosomia, hypoglycemia, jaundice, respiratory distress syndrome, polycythemia, and hypocalcemia have been reported with varying frequency in the infants of women with gestational diabetes. Macrosomia and associated complications of labor and delivery are the most frequent and serious types of morbidity. A simplistic view of macrosomia is that it results from the delivery of excess glucose to the fetus as a consequence of maternal hyperglycemia. Indeed, there appears to be a weak positive correlation between the degree of maternal glycemia and birth weight or the frequency of macrosomia. However, maternal glycemia accounts for only a small fraction of the variance in the birth weights of the infants of mothers with gestational diabetes (Kjos and Buchanan, 1999).

### 1.7.8.3 Effects on the developing baby

- ✓ **Baby being large for its gestational age** – i.e. weighing more than 4kg (8.8lbs) (macrosomia) – this increases the need for induced labour or a caesarean birth, and may lead to birth problems such as shoulder dystocia.
- ✓ **Other potential problems-** i.e. hypoglycemia (very low blood sugar), jaundice, electrolyte abnormalities, seizures, and breathing problems due to immature lungs (called respiratory distress syndrome).

- ✓ **Attention Deficit Hyperactivity Disorder (ADHD):** A new study published by the Archives of Pediatrics & Adolescent Medicine found that children born to mothers who had gestational diabetes are twice as likely to meet the criteria for Attention Deficit Hyperactivity Disorder (ADHD) by age 6 as those whose mothers did not develop the condition.
- ✓ **Development of type 2 diabetes:** They may also be at risk for developing type 2 diabetes later in life (American Diabetes Association, 2014)

#### **1.8.3.4 Diagnosis**

The diagnosis of gestational diabetes is based on the results of an oral glucose-tolerance test, except in women with severe hyperglycemia, who should be considered to have type 1 or type 2 diabetes and treated accordingly. There is no agreement about the conduct or interpretation of the oral glucose-tolerance test in pregnant women. The approach recommended in 1979 by the National Diabetes Data Group was based on a three-hour, 100-g test with use of criteria developed to quantify the risk of subsequent diabetes in the mother. Other criteria, incorporating lower glucose concentrations identify additional pregnant women with an increased risk of fetal macrosomia and cesarean delivery in the absence of specific treatment. However, most of these women and their infants are not at risk for glucose-related morbidity (Kjos and Buchanan, 1999).

#### **1.8.3.5 Treatment**

Gestational diabetes is harmful for women and the baby; the mother needs to start treatment quickly. Treatment for gestational diabetes aims to keep blood glucose levels equal to those of pregnant women who don't have gestational diabetes. Treatment for gestational diabetes always includes special meal plans and scheduled physical activity. It may also include daily blood glucose testing and insulin injections.

The American Diabetes Association suggests the following targets for women who develop gestational diabetes during pregnancy. More or less stringent glycemic goals may be appropriate for each individual.

- Before a meal (pre-prandial): 95 mg/dl or less
- 1-hour after a meal (postprandial): 140 mg/dl or less
- 2-hours after a meal (postprandial): 120 mg/dl or less

Women will need help from her doctor, nurse educator, and other members of her health care team so that her treatment for gestational diabetes can be changed as needed. For the women as the mother-to-be, treatment for gestational diabetes helps lower the risk of a cesarean section birth that very large babies may require. Sticking with the treatment for gestational diabetes will give the patient a healthy pregnancy and birth, and may help her baby avoid future poor health (American Diabetes Association, 2014).

#### **1.8.4 Anemia**

Anemia is a decrease in the amount of hemoglobin and red blood cells. Anemia is a relatively normal finding in pregnancy. Plasma is the watery, non cellular component of blood. In pregnancy, there is an increase in plasma volume of the blood in order to help supply oxygen and nutrients to mother and baby. There can be a 20% increase in the total number of red blood cells but the amount of plasma increases even more causing dilution of those red cells in the body. A hemoglobin level of pregnancy can naturally lower to 10.5 gm/dL representing a normal anemia of pregnancy (Benjamin, 2012). It is one of the most commonly encountered medical disorders during pregnancy. In developing countries it is a cause of serious concern as, besides many other adverse effects on the mother and the fetus it contributes significantly high maternal mortality. According to United Nation declaration 1997, anemia is a major public health problem that needs total elimination. It is estimated that globally two billion people suffer from anemia or iron deficiency (Sharma and Shankar, 2010). According to world Health Organization estimates, up to 56% of all women living in developing countries are anemic (Benoist, 2005). In 2011, 29% (496 million) of non-pregnant women and 38% (32.4 million) of pregnant women aged 15-49 years were anemic. In India, National Family Health Survey in 1998 to 99 shows that 54% of women in rural and 46% women in urban areas are anemic. The relative prevalence of mild, moderate, and severe anemia are 13%, 57% and 12% respectively in India (ICMR data). According to WHO, hemoglobin level below 11gm/dl in pregnant women constitutes anemia and hemoglobin below 7gm/dl is severe anemia. The Center for Disease Control and Prevention (1990) defines anemia as less than 11gm/dl in the first and third trimester and less than 10.5gm/dl in second trimester (Sharma and Shankar, 2010).

**Table 1.3: The Indian Council of Medical Research Categories of anemia**

Category	Anemia severity	Haemoglobin level(mg/dl)
1	Mild	10.0-10.9
2	Moderate	7.00-10.0
3	Severe	<7.00
4	Very severe(decompensated)	<4.00

(Sharma and Shankar, 2010)

#### **1.8.4.1 Causes**

The following are ways red blood cells can be affected and lead to anemia:

- A lack of iron in the diet as a result of not eating enough iron-rich foods or the body's inability to absorb the iron being consumed. Learn more about how to get iron naturally.
- Pregnancy itself because the iron being produced is needed for the woman's body to increase her own blood volume. Without an iron supplement, there is not enough iron to feed the blood supply of the growing fetus.
- Heavy bleeding due to menstruation, an ulcer or polyp, or blood donation causes red blood cells to be destroyed faster than they can be replenished.
- Parasite infections such as hook worms, ascaris, and schistosomiasis can lower blood hemoglobin (Hb) concentrations.
- Acute and chronic infections, including malaria, cancer, tuberculosis, and HIV can also lower blood Hb concentrations.
- The presence of other micro nutrient deficiencies, including vitamins A and B12, folate, riboflavin, and copper can increase the risk of anemia (Benoist, 2005).

#### **1.8.4.2 Types of anemia**

##### **Iron Deficiency Anemia**

Iron deficiency remains the most important cause of anemia in pregnancy in developing countries. Iron deficiency anemia is defined as anemia accompanied by depleted iron stores and signs of a compromised supply of iron to the tissues (WHO, 2001). There is

variation in hemoglobin levels during pregnancy; at the beginning of a pregnancy, there is a normal reduction in hemoglobin level followed by a slight rise towards the end of pregnancy. The initial reduction has been explained to result from increased red cell mass and demands of the fetus which exceeds iron intake with consequent reduction in iron stores of the woman's body. Thus, the World Health Organization has defined anemia in pregnancy as a hemoglobin value below 11 g/dl (Lelissa, 2015). There are two known factors which contribute to development of iron deficiency anemia (IDA) in pregnancy; the first is the woman's iron stores at the time of conception and the second is the amount of iron absorbed during gestation. The fact that anemia frequently does occur in pregnancy among women in developing countries is an indication that preexisting iron stores are often inadequate and physiological adaptations to pregnancy are insufficient to meet the increased requirements (WHO, 2001).

### **Folate Deficiency Anemia**

Folate refers to Folic Acid, which is a water-soluble vitamin that can help prevent neural tube defects during pregnancy. Folic Acid is a common supplement taken by pregnant women, but it can also be found in fortified foods such as cereals, leafy vegetables, bananas, melons and legumes. The incidence of folic acid deficiency is relatively high, 0.5–26%, and is commonly found in multiparas over 30 years of age. A diet lacking in folic acid can lead to a reduced number of red blood cells in the body, therefore leading to a deficiency. Folate deficiency can directly contribute to certain types of birth defects, such as neural tube abnormalities (spina bifida) and low birth weight (Kozuma, 2008).

### **Vitamin B12 Deficiency Anemia**

Vitamin B-12 is also a necessary vitamin for the body to have to help with the production of red blood cells. Although some women may consume enough B-12 in their diet, it is possible their body cannot process the vitamin, and this causes them to have the deficiency. This may contribute to birth defects, such as neural tube abnormalities, and could lead to preterm labor (Sharma and Shankar, 2010).

#### **1.8.4.3 Risk Factors**

All pregnant women are at risk for becoming anemic. That's because they need more iron and folic acid than usual. But the risk is higher if:

- Women with multiples pregnancy (more than one child)
- If she had two pregnancies close together
- If vomit a lot because of morning sickness
- A pregnant teenager
- If do not eat enough foods that are rich in iron
- If had anemia before becoming pregnant (Benoist, 2005).

#### **1.8.4.4 Effects on baby**

How anemia could affect the pregnancy, depends on the type of anemia the patient have. In mild cases, there's probably nothing to worry about, but severe iron-deficiency anemia could affect how baby grows and put her at risk for preterm birth. The woman may have palpitations, tachycardia, breathlessness, increased cardiac output leading on to cardiac stress which can cause de-compensation and cardiac failure which may be fatal. Increased incidence of pre-term labour (28.2%), pre-eclampsia (31.2%) and sepsis have been associated with anemia. Genetic anemia can increase the chances of complications for both mother and baby, so it's important that pregnant women get good prenatal care throughout her pregnancy (Sharma and Shankar, 2010).

#### **1.8.4.5 Treatment**

If the patient is anemic during pregnancy, she may need to start taking an iron supplement and/or folic acid supplement in addition to her prenatal vitamins. Her doctor may also suggest that should add more foods that are high in iron and folic acid to her diet. In addition, she'll be asked to return for another blood test after a specific period of time so her doctor can check that her hemoglobin and hematocrit levels are improving. To treat vitamin B12 deficiency, her doctor may recommend that to take a vitamin B12 supplement.

The doctor may also recommend that you include more animal foods in diet, such as:

- meat
- eggs
- dairy products (Lelissa, 2015)

### **1.8.4.6 Prevention**

Interventions for the prevention and control of anemia can be implemented by leveraging existing health, education and food-production systems as a delivery platform in the following ways.

- ❖ Intermittent iron and folic acid supplementation is advised in menstruating women living in settings where the prevalence of anemia is 20% or higher.
- ❖ Daily oral iron and folic acid supplementation is recommended as part of antenatal care, to reduce the risk of low birth weight, maternal anemia and iron deficiency. In addition to iron and folic acid, supplements may be formulated to include other vitamins and minerals, according to the United Nations Multiple Micronutrient Preparation (UNIMAP), to overcome other possible maternal micronutrient deficiencies.
- ❖ In areas where the prevalence of anemia among pregnant women is lower than 20%, intermittent iron and folic acid supplementation in non-anemic, pregnant women is advised, to prevent anemia and to improve pregnancy outcomes.
- ❖ In the postpartum period, iron supplementation, either alone or in combination with folic acid, for at least 3 months, may reduce the risk of anaemia by improving the iron status of the mother.
- ❖ Fortification of wheat and maize flours with iron, folic acid and other micronutrients is advised in settings where these foods are major staples.
- ❖ In malaria-endemic areas, the provision of iron and folic acid supplements should be made in conjunction with public health measures to prevent, diagnose and treat malaria.
- ❖ In emergencies, pregnant and lactating women should be given the United Nations Children's Fund (UNICEF)/WHO micronutrient supplement providing one RNI (recommended nutrient intake) of micronutrients daily (including 27 mg iron), whether or not they receive fortified rations. Iron and folic acid supplements, when already provided, should be continued.
- ❖ All pregnant women with active tuberculosis should receive multiple micronutrient supplements that contain iron and folic acid and other vitamins and minerals, according to the UNIMAP, to complement their maternal micronutrient needs.

- ❖ Multiple micronutrient supplements offer important benefits pregnant women in poor settings, particularly for pregnant women with HIV to reach recommended levels.
- ❖ Exclusive breastfeeding of infants for up to 6 months of age should be protected, promoted and supported. The beneficiaries include the infant and the mother (i.e. longer amenorrhea, increased birth spacing), as well as the newborn (an important source of iron, which is very well absorbed in breast milk) (WHO, 2014).

### **1.8.5 Thyroid diseases**

Thyroid disease is the second most common endocrine disease to affect women of reproductive age (Soldin, 2006). As early in pregnancy in normal women, as a consequence of the weak thyroid-stimulating activity of chorionic gonadotropin, serum free thyroxine concentrations may increase and thyrotropin concentrations may fall. In a small proportion of women, gestational thyrotoxicosis is the result (Toft, 2004). Thyroid disorders can have adverse reproductive and pregnancy implications. Although gestational hyperthyroidism is uncommon (0.2%), gestational hypothyroidism occurs in higher prevalence (2.5%) and can lead to neonatal and child neuro developmental deficits and maternal obstetric complications (Soldin, 2006). So the changes that occur to the thyroid gland and the measurement of thyroid hormone are

- Goiter commonly develops during pregnancy if iodine intake is low. Iodine therapy prevents its development.
- Fetal thyroid and fetal hypothalamic pituitary thyroid axis develop independently of maternal thyroid status at 10 weeks of gestation. At 11 to 12 weeks the fetal TSH is present in the circulation.
- During the first trimester the fetus relies on the maternal thyroxin levels (Mishra, 2012)

Moreover, hormonal changes and metabolic needs during pregnancy result in profound alterations of biochemical and clinical parameters which characterize the thyroid gland, changes that express themselves through a state of thyroid hyper stimulation and a relative hypothyroxinemia or a sub clinic hypothyroidism, a limiting form between normality and pathology, but nevertheless closer to the pathology during pregnancy (Vartej, 2010). Two types of thyroid dysfunction are available these are:



- Hypothyroidism
- Hyperthyroidism

### **1.8.5.1 Hypothyroidism**

Hypothyroidism can be pre-existent or may begin during pregnancy period. Most of the patients who presented hypothyroidism during pregnancy have a history of thyroid disease for which they have undergone treatment (medical, surgical or radioisotopes). In Indian subcontinent, the incident of subclinical hypothyroidism in pregnancy is reported as 6.47% (Mishra, 2012). Hypothyroidism is difficult to be diagnosed during pregnancy as the signs can belong to pregnancy itself. Changes in thyroid function have a major negative impact on both mother and fetus (Vartej, 2010). There have since been several studies on maternal hypothyroidism and pregnancy complications. In one study it was found that in patients with antibody evidence of autoimmune thyroid diseases but with normal thyroid function, there was increase in early spontaneous abortion and prematurity (Klein, 1991). Hypothyroidism also associated with included anemia (23.0%), pregnancy induced hypertension (26.9%), postpartum hemorrhage (7.7%), intrauterine growth retardation (15.4%), postdatism (30.8%), and deficient lactation (19.2%). Perinatal mortality was 3.9% (Buckshee, 1992). Perinatal morbidity and mortality were also high mainly because of placental abruption, and reflected frequent low birth weight (31%) and fetal death (12%) (Casey, 2005).

Proper oxygenation of the fetal-placenta complex during pregnancy and it is frequently lower at pregnant women who continued to have hypothyroidism until the due term. In hypothyroidism, the cardiac debit is not adequate and the uterus-placenta circulation becomes insufficient, which induces a moderate and chronic fetal hypoxia, fetal bradycardic, fetal hypotrophy, and diminution of fetal moves and an insufficient tolerance of the delivery by the fetus. The intrauterine chronic hypoxia of the newborn can be met in the literature at variable percentages between 14%-22% at pregnant women with hypothyroidism (Vartej, 2010).

### **Diagnosis**

The diagnosis of hypothyroidism can be established readily by measuring serum FT4 and TSH levels. In patients with primary hypothyroidism, TSH levels are elevated and FT4 low. In patients with central or secondary hypothyroidism, TSH level may be normal or low and the FT4 level or FT4 index is low (hypothyroxinemia). In patients with

subclinical hypothyroidism, the FT4 value is normal and the TSH level is slightly elevated. Anti-TPOAb and Anti-TPAg should be measured in pregnant women with possible hypothyroidism to determine whether Hashimoto thyroiditis is the cause. Often, measuring TPOAb levels is sufficient because results are usually positive in patients with Hashimoto thyroiditis. CBC count and liver function tests should also be conducted because anemia is observed in as many as 30% to 40% of patients because of decreased erythropoiesis. Concomitant vitamin B-12 or folic acid deficiency should be considered if the anemia is macrocytic (Soldin, 2006).

### **1.8.5.2 Hyperthyroidism**

The incidence of hyperthyroidism in pregnant women has been reported to be approximately 0.2%; the leading cause is Graves's disease (Lazarus, 2005). Hyperthyroidism treatment includes anti-thyroid drugs or surgery to avoid adverse effects on the neonate, such as prematurity, intrauterine growth retardation, and fetal or neonatal thyrotoxicosis. Although hyperthyroidism in pregnancy is uncommon, effects on both mother and child are serious if untreated. The use of propylthiouracil (PTU) is recommended together with measurement of TSH receptor antibodies at 36 weeks gestation since diagnosis with radiolabeled iodine is contraindicated during pregnancy (Soldin, 2006).

### **Diagnosis**

The diagnosis of hyperthyroidism is usually confirmed by TSH and FT4 testing. The sensitivity and specificity of these assays is particularly important in pregnant patients. Higher than normal serum T4 immunoassay value, together with a resin T3 uptake value that is not reduced, should confirm the clinical suggestion of hyperthyroidism. Patients with Graves' disease usually have positive test results for thyroid-stimulating immunoglobulins. Women who have positive test results for thyroid peroxides antibodies (TPOAb) early in pregnancy or shortly after delivery are at risk for developing postpartum thyroiditis (PPT) FT3 values should be measured when TSH is suppressed but the FT4 level is normal. An elevated T3 level confirms T3 toxicosis. CBC count, liver function tests, and calcium and magnesium laboratory tests should be obtained after making the diagnosis of hyperthyroidism. Elevated liver function test results,

normochromic normocytic anemia, mild neutropenia, mild hypocalcaemia, and hypomagnesaemia can occur with hyperthyroidism (Soldin, 2006).

## **1.9 Epidemiological data**

Maternal mortality is unacceptably high. About 800 women die from pregnancy- or childbirth-related complications around the world every day. In 2013, 289 000 women died during and following pregnancy and childbirth. Every 10 minutes a woman dies in India from pregnancy and complications of child birth. Almost all of these deaths occurred in low-resource settings, and most could have been prevented (WHO, 2015). The majority of maternal deaths are concentrated in South Asia (187,000 or 35 percent) and West and Central Africa (162,000 or 30 percent). Eastern and Southern Africa made up 19 percent (103,000) of all maternal deaths (Richards, 2015). About 16 million girls aged between 15 and 19 give birth each year. They account for more than 10% of all births. In the developing world, about 90% of the births to adolescents occur in marriage. In low- and middle-income countries, complications from pregnancy and childbirth are the leading cause of death among girls 15-19 (WHO, 2015). There are large disparities between countries, with few countries having extremely high maternal mortality ratios around 1000 per 100 000 live births. There are also large disparities within countries, between women with high and low income and between women living in rural and urban areas. A woman's lifetime risk of maternal death – the probability that a 15 year old woman will eventually die from a maternal cause is 1 in 3700 in developed countries, versus 1 in 160 in developing countries. Women in developing countries have on average many more pregnancies than women in developed countries, and their lifetime risk of death due to pregnancy is higher. The maternal mortality ratio in developing countries in 2013 is 230 per 100 000 live births versus 16 per 100 000 live births in developed countries (WHO, 2015).

**Trends:** The number of women dying due to complications during pregnancy and childbirth has decreased by 45% from an estimated 523 000 in 1990 to 289 000 in 2013. The progress is notable, but the annual rate of decline is less than half of what is needed to achieve the Millennium Development Goal (MDG) target of reducing the maternal mortality ratio by 75% between 1990 and 2015, which would require an annual decline of 5.5%. The 45% decline since 1990 translates into an average annual decline of just 2.6%. Between 1990 and 2000, the global maternal mortality ratio decreased by 1.4% per year,

while from 2000 to 2013 progress accelerated to a 3.5% decline per year (WHO, 2015). Bangladesh still records a high maternal mortality ratio, with 320 deaths per 100,000 births. This means that about 12,000 women die from pregnancy or childbirth related complications every year - more than 30 every day. In the period 2007-11 Bangladesh reported a maternal mortality ratio of 220 deaths per 100,000 live births (Commonwealth health.org, 2015).

**Table 1.4: Basic data about maternal mortality in Bangladesh**

Maternal mortality ratio (deaths per 100,000 births)	320
Births for women aged 15-19 (per 1000)	127
Antenatal care coverage (pregnant women attend once, %)	49
Births delivered at home (%)	85
Births delivered at a public or private health centre	9
Aware of pregnancy complications during pregnancy (%)	30
Treatment for complications from medically trained provider	42
Unqualified provider	33
Did not seek help	38

All Statistics from UNICEF State of the World's Children 2009 report and BDHS 2007

(NIPORT, 2013)

CHAPTER 2  
LITERATURE REVIEW

## **2.1 Maternal mortality in rural Bangladesh: the Jamalpur District**

During the month of September 1982 to August 1983 Khan did a study at Jamalpur district in Bangladesh and found 9,317 live births and 58 maternal deaths were recorded in Melanda and Islampur upazilas in the Jamalpur district of rural Bangladesh, giving a maternal mortality rate of 62.3 per 10,000 live births. Maternal mortality was positively related to maternal age and parity, with the mortality risk rising very sharply beyond age 35 years, and beyond parity four among women aged 25-34 years in particular. The most common causes of maternal death were eclampsia (20.7 percent), septic abortion (20.7 percent), postpartum sepsis (10.3 percent), obstructed labor (10.3 percent), and antepartum and postpartum hemorrhage (10.3 percent). These findings indicated that family planning, by decreasing the likelihood of pregnancy after age 35 and parity four can help reduce the proportion of women at risk of maternal mortality (Khan, 1986).

## **2.2 Maternal Mortality in Matlab, Bangladesh: 1976-85**

Koenig *et al* conducted a study on maternal mortality in Matlab, Bangladesh during the 1976-85 periods. The study employed a multiple-step procedure to identify maternity-related deaths to all reproductive-aged women within the study area during this period. A total of 387 maternal deaths were identified, resulting in an overall maternal mortality ratio of 5.5 per 1,000 live births. The introduction of a family planning program in half of the Matlab study area led to a moderate but significant reduction in maternal mortality rates, relative to the comparison area. This appears to have been primarily due to a reduction in the overall number of pregnancies in the treatment area, since among women who became pregnant, mortality risks remained high. The results of this study underscored the need for a broad-based service strategy that includes but was not limited solely to family planning, in order to achieve significant reductions in maternal mortality levels in settings such as rural Bangladesh (Koenig *et al.*, 1988).

## **2.3 Gestational anemia**

Wahed investigated that most anemia's during pregnancy results from an increased need for iron in the mother body in Bangladesh. As women body needs to make more blood in their pregnancy period. Often dietary supplementation did not provide enough iron to meet the extra needs. Also the growing baby takes all the iron it needs from mother, regardless of how much iron is stored in mother's blood. Gestational Anemia contributed

significantly to maternal morbidity and mortality, IUGR, preterm delivery and perinatal morbidity and mortality. A high proportion of women in both industrialized and developing countries become anemic during pregnancy. The most important cause of gestational anemia due to iron deficiency, because high iron requirements during pregnancy are not easily fulfilled by dietary intake. Adequate iron stores can help a pregnant women replace lost red blood cells. So, iron supplementation is strongly recommended for all pregnant women in developing countries. Oral iron intake is the treatment of choice and almost all pregnant women can be treated effectively with oral iron preparation during their pregnancy period (Wahed, 2010).

#### **2.4 Prenatal screening in rural Bangladesh: from prediction to care**

In year 1987-1993 Vanneste investigated about the role of antenatal care in Bangladesh. He showed that the role of antenatal care was being increasingly questioned, particularly in resource poor environments. This population-based cohort study was undertaken to assess whether prenatal screening could identify women at risk of severe labour or delivery complications in a rural area in Bangladesh. Antenatal risk markers, signs and symptoms were assessed for their association with severe maternal complications including dystocia, malpresentation, haemorrhage, hypertensive diseases, twin delivery and death. A single blood pressure measurement and the assessment of fundal height, on the other hand, may detect a substantial number of women with hypertensive diseases and twin pregnancies. In addition, women who had an antenatal visit were four times more likely to deliver with a midwife than women who had no antenatal visit. If effective emergency obstetric care would be promoted and delivered in skilled hands, it might become an effective instrument to facilitate better use of emergency obstetric care services (Vanneste, 2000).

#### **2.5 Gestational diabetes: current aspects on pathogenesis and treatment**

In Germany Tamás and Kerényi investigated about the causes and diagnosis of gestational diabetes (GDM) which is a carbohydrate intolerance resulting in hyperglycemia of variable severity with onset or first recognition during pregnancy. The incidence of GDM was between 0.15-15%. The predominant pathogenic factor in GDM could be the inadequate insulin secretion. In order to screen for disturbances of carbohydrate metabolism during pregnancy a simple method suitable for all pregnant

women would be desirable, however no such method was available then. According to the WHO recommendation the screening for GDM should be performed universally with the standard 75 g. GTT evaluating only the 2-hour blood glucose values or together with the fasting ones. The latter could provide even an exact diagnosis of the carbohydrate metabolic state. To manage GDM the first step prompt after diagnosis was to educate adequate dietary needs. If the blood sugar values in spite of an adequate diet exceed the desirable target values, insulin treatment had to be initiated. GDM is a predictor of diabetes (mainly type 2) later in life. The cumulative incidence of type 2 diabetes was about 50% at 5 years. This review of the current literature including author's own experience strongly supposes that prior GDM was also a predictor or even an early manifestation of the metabolic (insulin resistance) syndrome. By all means GDM was a cardiovascular risk factor that could be screened to prevent late complications. The previously presented evidence also strongly suggested that yearly check-ups for women with previous GDM were inevitably important (Tamás and Kerényi, 2001).

## **2.6 The Safe Motherhood Initiative: why has it stalled?**

Maine and Rosenfield in year 1985 conducted a research on complications of pregnancy and childbirth in United States. They have shown that complications of pregnancy and childbirth were the leading cause of death and disability among women of reproductive age in developing countries. After decades of neglect, the founding of the Safe Motherhood Initiative in 1987 promised action on this problem. A dozen years later, there was no evidence that maternal mortality had declined and there are still few sizeable programs. A major reason for this disappointing record was that the initiative lacks a clear, concise, feasible strategy. This article reviewed the available options and proposes a strategy based on improving the availability and quality of medical treatment of obstetric complications. Once district hospitals and health centers provide such needed care, community mobilization to improve prove utilization might be beneficial. Substantial reductions in maternal deaths would be possible in a relatively short period of time if this strategy were embraced (Maine and Rosenfield, 1999).



## **2.7 Levothyroxine treatment in euthyroid pregnant women with autoimmune thyroid disease: effects on obstetrical complications**

In year November 2002 to October 2004 Negro *et al* have done a study in Italy on euthyroid women with autoimmune thyroid disease. The result showed that impairment of thyroid function during gestation and seems to suffer from a higher rate of obstetrical complications. Author sought to determine whether these women suffer from a higher rate of obstetrical complications and whether levothyroxine (LT<sub>4</sub>) treatment exerts beneficial effects. A total of 984 pregnant women were studied from November 2002 to October 2004; 11.7% were thyroid peroxidase antibody positive (TPOAb<sup>+</sup>).TPOAb<sup>+</sup> patients were divided into two groups: group A (n = 57) was treated with LT<sub>4</sub>, and group B (n = 58) was not treated. The 869 TPOAb<sup>-</sup> patients (group C) served as a normal population control group. At baseline, TPOAb<sup>+</sup> had higher TSH compared with TPOAb<sup>-</sup>; TSH remained higher in group B compared with groups A and C throughout gestation. Free T<sub>4</sub> values were lower in group B than groups A and C after 30 wk and after parturition. Groups A and C showed a similar miscarriage rate (3.5 and 2.4%, respectively), which was lower than group B (13.8%) [ $P < 0.05$ ; relative risk (RR), 1.72; 95% confidence interval (CI), 1.13–2.25; and  $P < 0.01$ ; RR = 4.95; 95% CI = 2.59–9.48, respectively]. Group B displayed a 22.4% rate of premature deliveries, which was higher than group A (7%) ( $P < 0.05$ ; RR = 1.66; 95% CI = 1.18–2.34) and group C (8.2%) ( $P < 0.01$ ; RR = 12.18; 95% CI = 7.93–18.7). So it has been seen that, euthyroid pregnant women who are positive for TPOAb develop impaired thyroid function, which was associated with an increased risk of miscarriage and premature deliveries. Substitutive treatment with LT<sub>4</sub> was able to lower the chance of miscarriage and premature delivery (Negro *et al.*, 2006).

## **2.8 Anemia, Iron and Pregnancy Outcome**

Scholl and Reilly researched on maternal anemia in United States .They have showed that, if maternal anemia was diagnosed before mid pregnancy, it had been associated with an increased risk of preterm delivery. Maternal anemia detected during the later stages of pregnancy, especially the third trimester, often reflects the expected (and necessary) expansion of maternal plasma volume. Third-trimester anemia usually was not associated with increased risk of preterm delivery. High hemoglobin concentration, elevated hematocrit and increased levels of serum ferritin late in pregnancy, however, all had been

associated with increased preterm delivery. This increased risk may reflect in part the failure to expand maternal plasma volume adequately, thus diminishing appropriate placental perfusion. Although controlled trials of iron supplementation during pregnancy had consistently demonstrated positive effects on maternal iron status at delivery, they had not demonstrated reductions in factors that are associated with maternal anemia, i.e., increased risk of preterm delivery and infant low birth weight. One reason for discordant findings might be the exclusion of many gravidas with iron deficiency from these trials or the data concerning gravidas with pregnancy outcomes such as preterm delivery from the analysis. Finally, concerns had been voiced about harmful effects of iron supplementation during pregnancy. No adverse effects of iron supplementation on pregnancy outcome had been demonstrated to date. Questions about the efficacy of iron supplementation during pregnancy for reducing adverse outcomes such as preterm delivery and side effects from iron supplementation, including the potential for oxidation of lipids and DNA, require further research in iron-deficient women (Scholl and Reilly, 2000).

## **2.9 Diagnosis, Prevention, and Management of Eclampsia**

In year 2005 Sibai investigated in United States about the development of eclampsia that is associated with increased risk of adverse outcome for both mother and fetus, particularly in the developing nations. Pregnancies complicated by eclampsia require a well-formulated management plan. Women with a history of eclampsia were at increased risk of eclampsia (1–2%) and preeclampsia (22–35%) in subsequent pregnancies. Data at that time reveal an increase in the proportion of women who developed eclampsia beyond 48 hours after delivery. Other than early detection of preeclampsia, there were no reliable tests or symptoms for predicting the development of eclampsia. In developed countries, the majority of cases reported at that time were considered unpreventable. Magnesium sulfate was the drug of choice for reducing the rate of eclampsia developing intrapartum and immediately postpartum. There were 4 large randomized trials comparing magnesium sulfate with no treatment or placebo in patients with severe preeclampsia. The rate of eclampsia was significantly lower in those assigned to magnesium sulfate (0.6% versus 2.0%, relative risk 0.39, 95% confidence interval 0.28–0.55). Thus, the number of women needed to treat to prevent one case of eclampsia was 71. Recommendations for diagnosis, prevention, management, and counseling of these women were provided based on results of various studies and authors own clinical experience (Sibai, 2005)

## **2.10 WHO analysis of causes of maternal death: a systematic review**

Khan *et al* in United Kingdom have done a systematic review on selected datasets using prespecified criteria, and recorded dataset characteristics, methodological features, and causes of maternal deaths. They found hemorrhage, hypertensive disorders, sepsis, abortion, obstructed labour, ectopic pregnancy, embolism as the causes of death. They also investigated joint causes of death and heterogeneity due to methodological features and geographical region. Authors found hemorrhage, hypertensive disorders, abortion, and sepsis as major causes of maternal death in our country. They identified hemorrhage as the leading cause of maternal death in Asia with 30.8% morbidity (Khan *et al.*, 2006).

## **2.11 Preeclampsia, gestational hypertension and intrauterine growth restriction, related or independent conditions**

In United States during year August 1996 and December 1998 Villar *et al* have done a study on the comparison of the determinants and consequences of Preeclampsia, gestational hypertension, and unexplained intrauterine growth restriction. This was a secondary analysis of data collected in the World Health Organization (WHO) Antenatal Care Trial. They compared a range of determinants i.e Diabetes, renal or cardiac disease, previous preeclampsia, urinary tract infection, high maternal age, twin pregnancy, obesity, previous large-for-age birth, reproductive tract surgery, antepartum hemorrhage, reproductive tract infection etc. Fetal death, preterm delivery, and severe neonatal morbidity and mortality were the primary outcomes. In their study they found many common determinants between Preeclampsia and gestational hypertension. Conversely, preeclampsia and unexplained intrauterine growth restriction assumed to be independent biologic entities (Villar *et al.*, 2006).

## **2.12 Diabetes mellitus during pregnancy and the risks for specific birth defects: a population-based case-control study**

In year 1968 - 1980 Becerra did a study in United States about the risk for specific malformation among children of mothers with diabetes mellitus. In the Atlanta Birth Defects Case-Control Study, those risks for malformations were evaluated. The population-based study included 4929 live and stillborn babies with major malformations ascertained by the Metropolitan Atlanta Congenital Defects Program in the first year of life born to residents of Metropolitan Atlanta between 1968 and 1980. The study also

included 3029 no malformed live babies who were frequency-matched to case babies by race, period of birth, and hospital of birth. The relative risk for major malformations among infants of mothers with insulin-dependent diabetes mellitus (n = 28) was 7.9 (95% confidence interval [CI] 1.9, 33.5) compared with infants of non diabetic mothers. The relative risks for major central nervous system and cardiovascular system defects were 15.5 (95% CI = 3.3, 73.8) and 18.0 (95% CI = 3.9, 82.5), respectively. The absolute risks for major, central nervous system, and cardiovascular system malformations among infants of diabetic mothers were 18.4, 5.3, and 8.5 per 100 live births, respectively. Infants of mothers with gestational diabetes mellitus who required insulin during the third trimester of pregnancy were 20.6 (95% CI = 2.5, 168.5) times more likely to have major cardiovascular system defects than infants of non diabetic mothers. The absolute risk for infants of this group of diabetic mothers was 9.7% (Becerra, 1990).

## **Significance of the study**

Every year throughout the world approximately eight million women are suffering pregnancy-related complications and over half a million will die. In some developing countries, one in 11 pregnant women may die of pregnancy-related complications compared to one in 5000-10,000 (Lewis, 2003). Ours is also a developing country and there are 11,000 to 12,000 women dying from pregnancy or childbirth complications every year in Bangladesh (Common wealth health.org, 2015). The major direct causes of maternal deaths in Bangladesh are postpartum hemorrhage, eclampsia, complications of unsafe abortion, obstructed labour, postpartum sepsis, and violence and injuries. About one fourth of the total maternal death in rural Bangladesh is due to unsafe abortion and related complications (NIPORT, 2013). In rural Bangladesh, more than 75% of all births occur at home in the absence of skilled birth attendants (Sikder, 2014). More tragically, most deaths are avoidable. It is estimated that more than 80% of maternal deaths could be prevented or avoided through actions that are proven to be effective and affordable, even in resource-poor countries, but requires the right kind of information on which to base programmes. Knowing the level of maternal mortality is not enough; we need to understand the underlying factors that led to the deaths. Each maternal death or case of life-threatening complication has a story to tell and can provide indications on practical ways of addressing its causes and determinants. As maternal death due to pregnancy complications in our country is alarming, we choose this topic for conducting our research to enhance the knowledge about these complications among the women and make them aware to give birth of their children safely.

## **Aims and objectives of the study**

The aims and objectives of this study were to

- ❖ Explore the prevalence of pregnancy complication at Dhaka city in Bangladesh
- ❖ To identify the awareness level among the women.

**CHAPTER 3**  
**METHODOLOGY**

### **3.1 Study design**

In this study data was collected through interviews with a structured questionnaire. The study protocol was reviewed and approved by the supervisor.

### **3.2 Study area**

The study was conducted in different areas of Bangladesh which was listed below-

- Dhaka Paediatric Neonatal and General Hospital.
- Dhaka Medical college
- Bangabandhu Sheikh Mujib Medical University.
- Surjer Hashi Clinic
- Lab Aid hospital
- Central hospital
- Shaheed Suhrawardy Medical College

### **3.3 Study population**

A total of 300 pregnant women were included in the study and interviewed as per the questionnaire and all were in their third trimester.

### **3.4 Data collection**

During august 2015 to October 2015, in the study period the patient coming to the respective place was interviewed as per the questionnaire. Different clinical as well as generalized information including their address, weight, blood pressure, awareness on pregnancy complications, number of children, abortions, vaccination, history of taking medicines during pregnancy, water retention, kidney diseases, expected date of delivery, positioning of the child in placenta, and number of times visited facility during pregnancy were recorded for further analysis.

### **3.5 Statistical analysis**

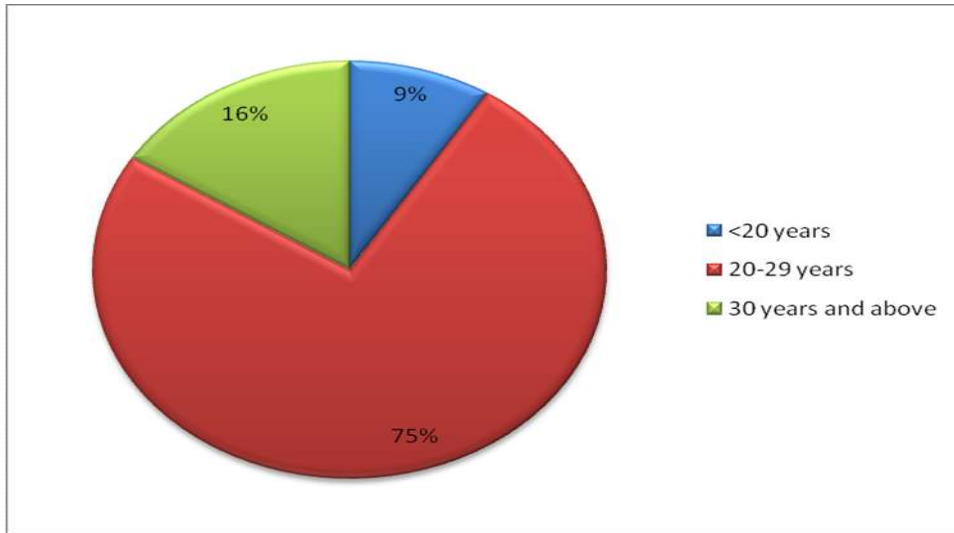
Data will be organized, tabulated and aggregated using Microsoft excel. Means a proportions of the epidemiological, social, behavioral and clinical parameters were compared amongst the study population.



# **CHAPTER 4**

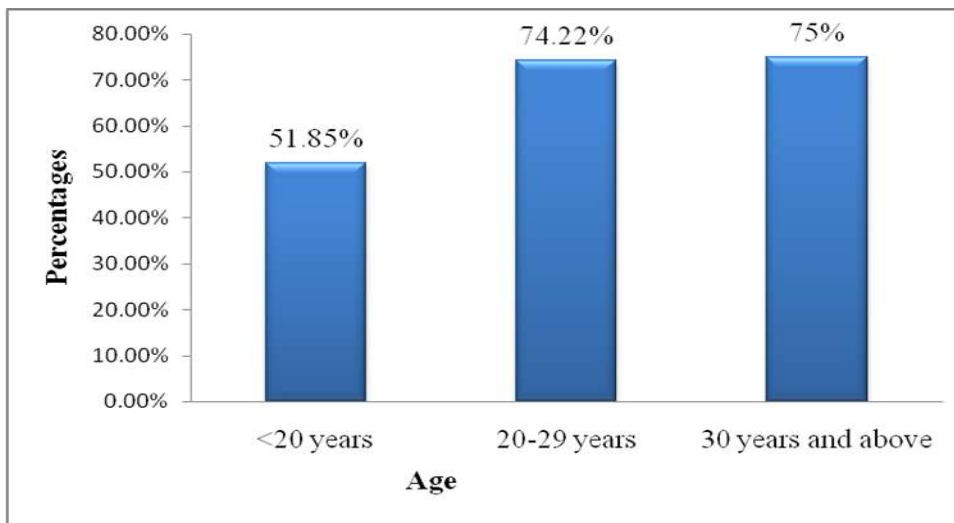
## **RESULTS**

#### 4.1 Age of the respondents



**Figure 4.1:** Different age groups of sample population

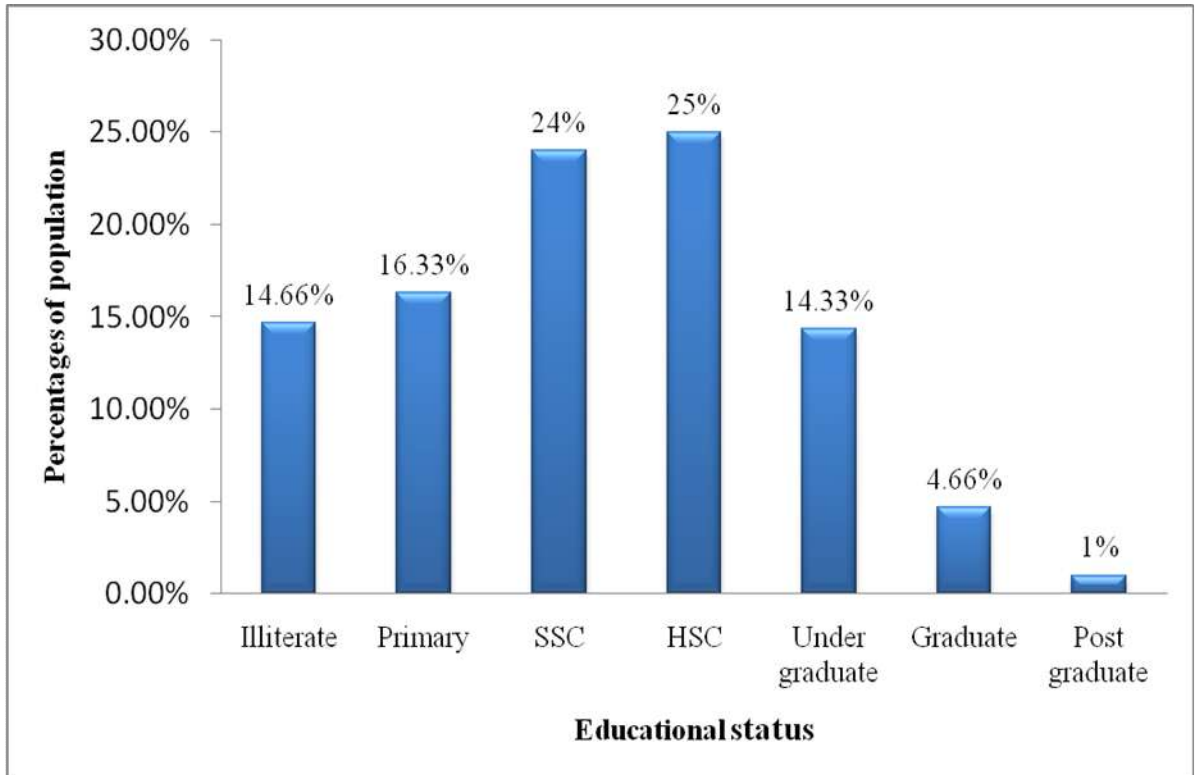
We divided the age range of these women into three categories shown in figure 1, where 9% respondents were below 20 years, 75% were 20 to 29 years and about 16% were in 30 years and above.



**Figure 4.2:** Patients with different complications within different age groups in the sample population

We have found that more than half (51.85%) of the respondents with age less than 20 years were suffering from complications. Age group with 20 to 29 years (74.22%) was suffering from complications and pregnant women with age 30 years and above 75% patients were facing with complications.

#### 4.2 Educational status of the respondents

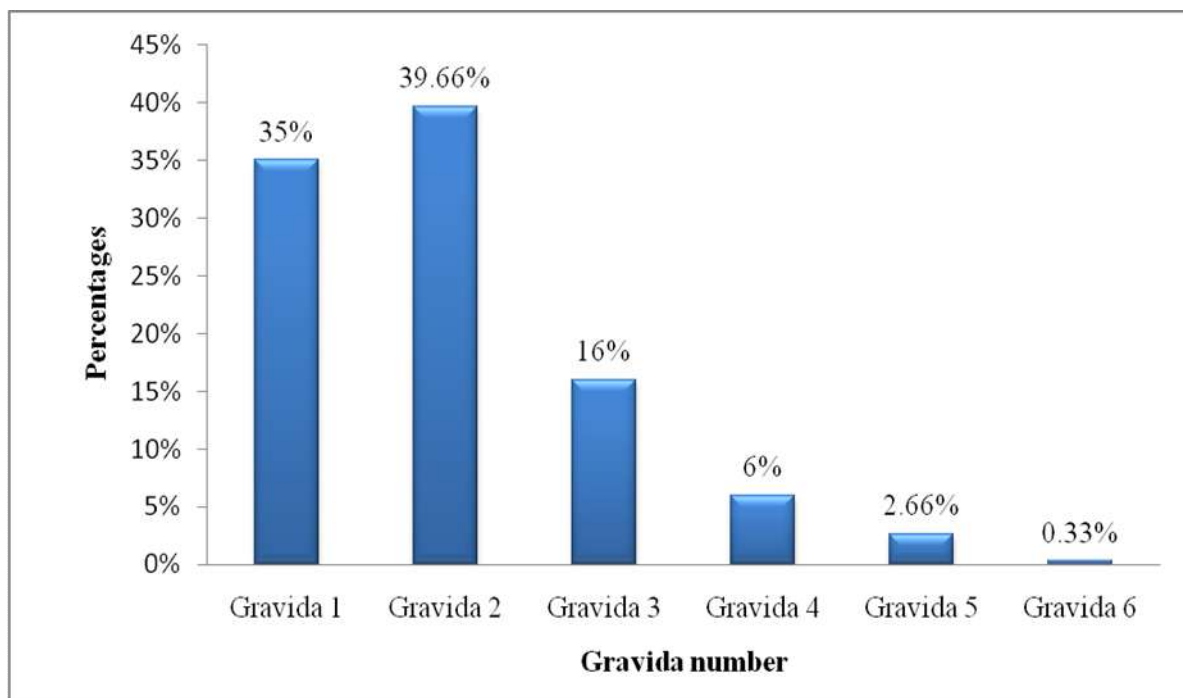


**Figure 4.3:** Educational status of sample population

Levels of education of the respondents were classified as Illiterate, Primary, SSC, HSC, Under Graduate, Graduate and Post Graduate. The educational status of these women is showing in figure-3. Here recorded data shows that 14.66% were illiterate or they had no schooling, 16.33% passed primary, 24% passed SSC, 25% passed HSC, 14.33% was undergraduate, 4.66% graduate and 1% was post graduate.

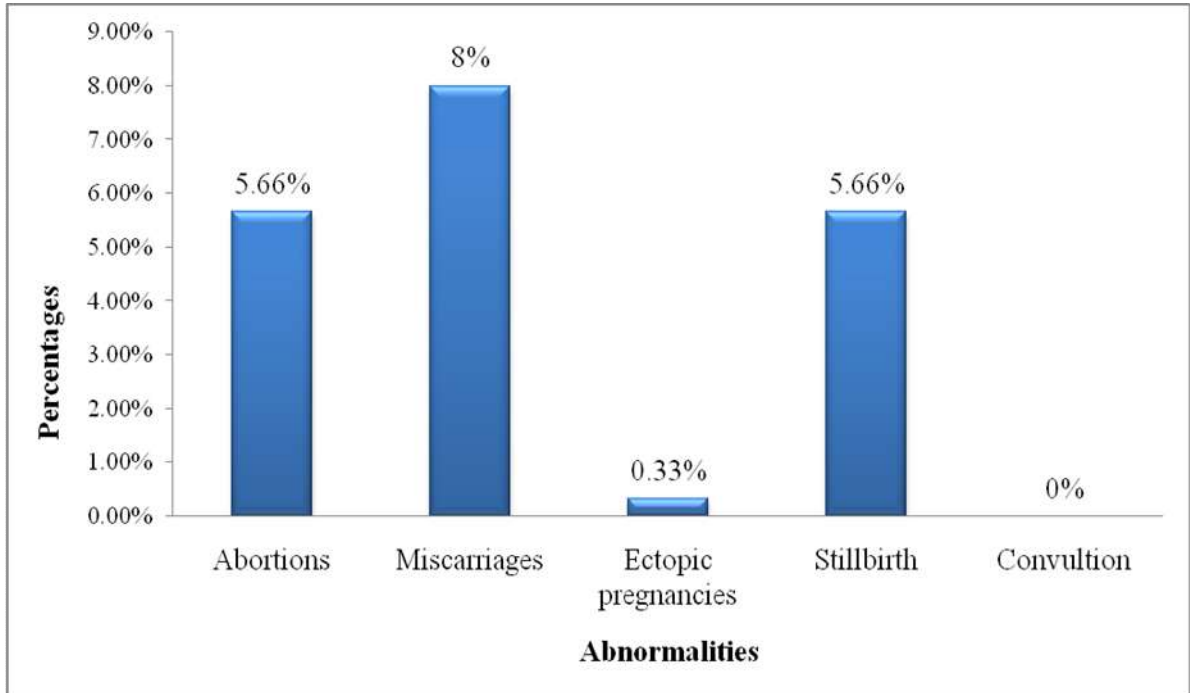
### 4.3 Obstetric history of respondents

We calculated the total obstetric history of our sample population with the abnormality they had during and before pregnancy. The total gravida of the women is given in figure 4.



**Figure 4.4:** Total number of pregnancy in sample women.

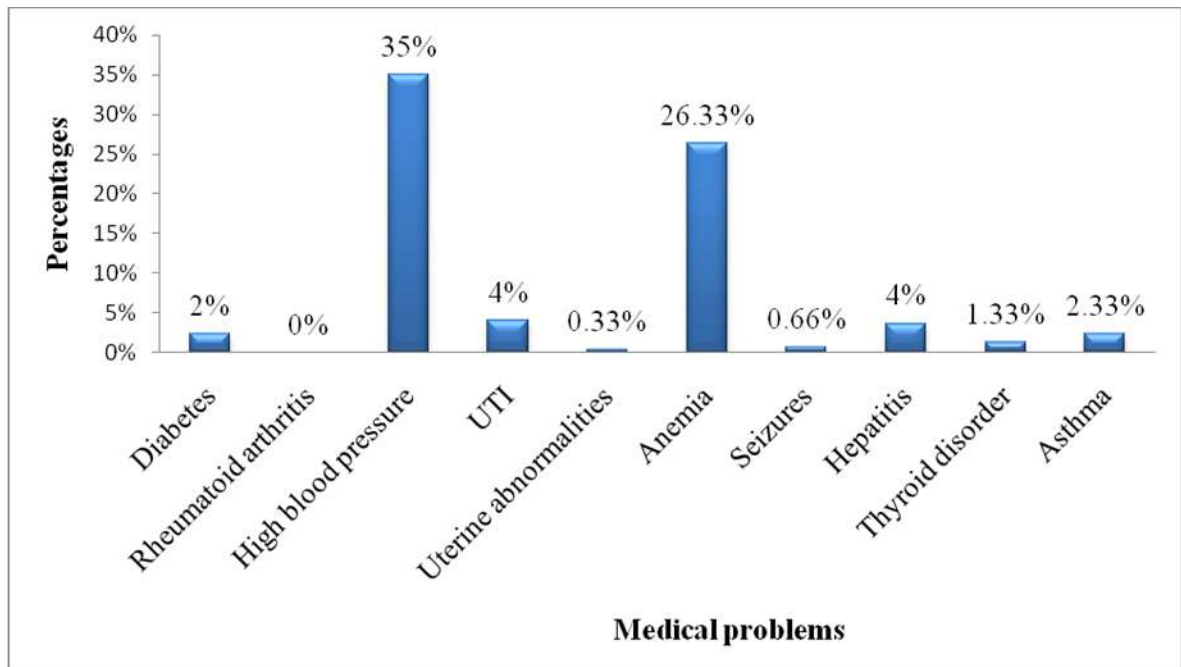
In our recorded data maximum women (39.66%) had in their second gravida. The proportion of others were first gravida (35%), gravida 3 (16%), gravida 4 (6%), gravida 5 (2.66%), gravida 6 (0.33%).



**Figure 4.5:** Pregnancy abnormalities in sample population

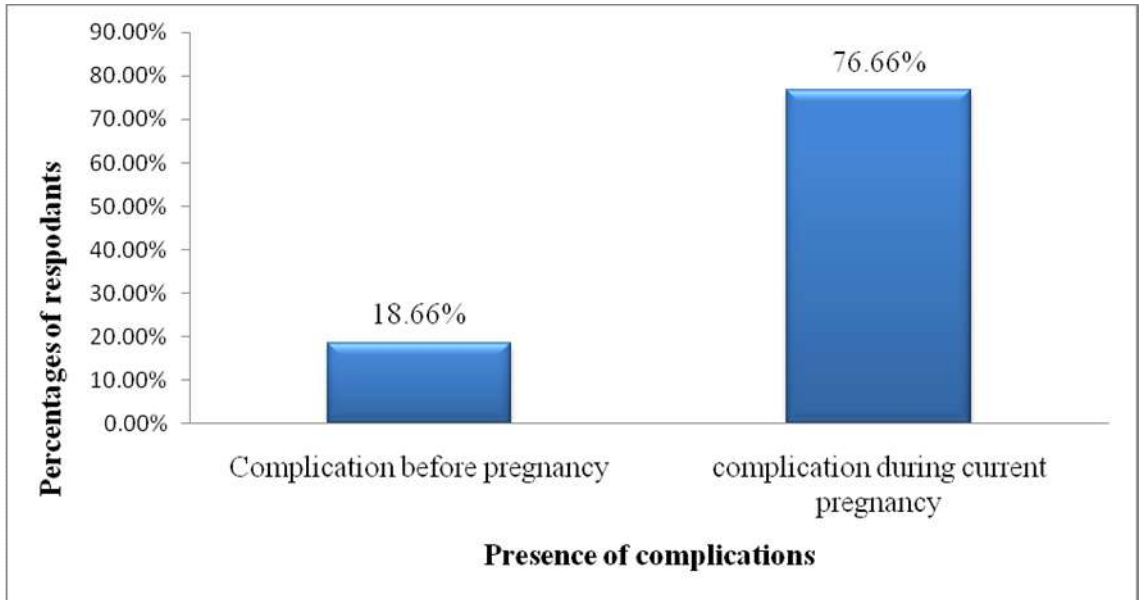
In figure 4.5 we have also shown the abnormalities that the sample women faced before or during pregnancy. Abortion occurred in 5.66%, miscarriage in 8%, ectopic pregnancy in 0.33%, stillbirth in 5.66% and convulsion did not find.

#### 4.4 History of medical complications among the samples



**Figure 4.6:** Medical problems in sample populations.

The proportion of women who developed medical complications among the entire sample is given in figure 4.6. We have found 230(76.66%) patients with various pregnancy related complications and 70(23.33%) patient without any complications. We also have found that most prevailed complications in our respondents were high blood pressure and preeclampsia (34.67%), anemia (26.33%), urinary incontinence or UTI (4%). Few patients were facing problems with diabetes (2.33%), (3.67%) with hepatitis or liver diseases, (2.33%) with asthma. Patients with other medical problems were insignificant.



**Figure 4.7:** Patients with complications before pregnancy and complications during pregnancy.

Among 230 patients with complications 18.66% had problems before their pregnancy and 76.66% had problem in their current pregnancy.

Though we decided to emphasize on 5 major complications like high blood pressure, preeclampsia, anemia, diabetes and thyroid, we have shown some other complications that can also complicate pregnancy.

#### **4.5 Hypertensive disorder in the respondents**

For hypertensive disorder we first listed the blood pressure of the patients with 140/90 or above that are showing in table 4.1.

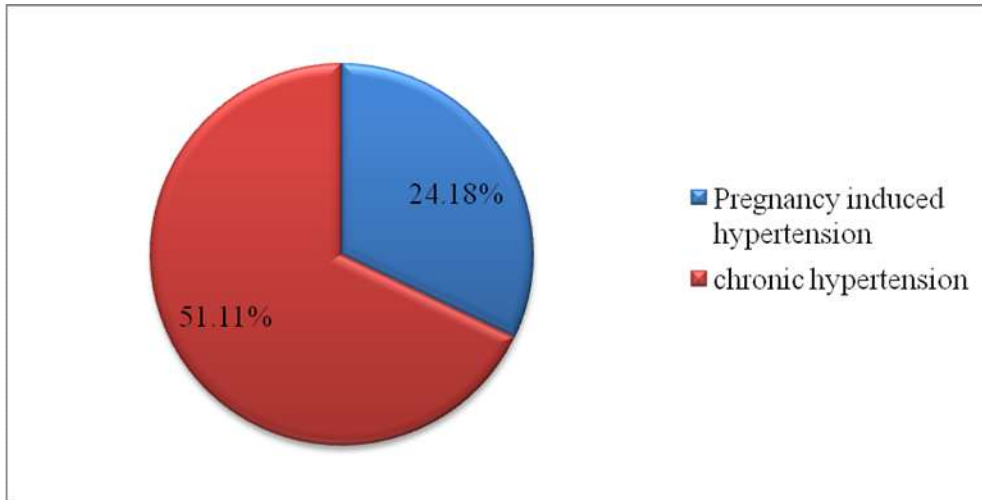
About 64.12% patient in our study had stage 1 hypertension and 28.39% had stage 2 hypertension. Few patients had pre hypertension and hypertensive crisis

**Table 4.1: Blood pressure ranges of the respondents**

<b>Stages</b>	<b>Blood pressure</b>	<b>Percentages of the patient</b>
Normal blood pressure	Below 120/80mmHg	0%
Pre hypertension	(120-139) mmHg systolic pressure and (80-89) mmHg diastolic pressure.	2.46%
Stage 1	(140-159) mmHg systolic pressure and (90-99) mmHg diastolic pressure	64.12%
Stage 2	Systolic pressure 160 mmHg or higher and diastolic pressure 100 mmHg or higher	28.39%
Hypertensive crisis (emergency are needed)	Systolic pressure is higher than180 mmHg and diastolic pressure is higher than 110 mmHg	4.93%

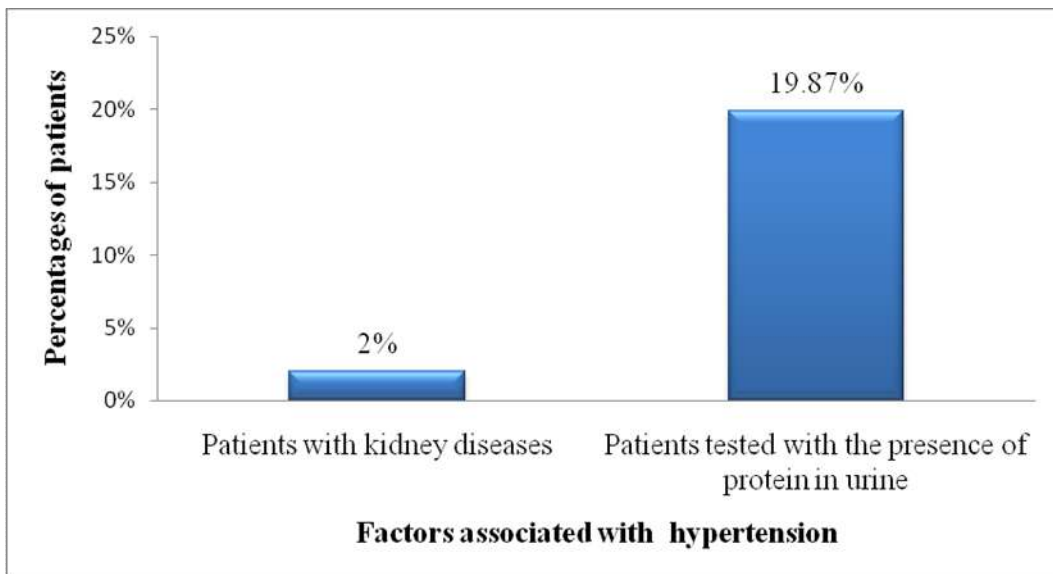


Some parameters are extremely associated with pregnancy induced hypertension and we have wanted to measure the possibility of being presence of these parameters in our sample population with PIH. Percentages of the patient's with these parameters are given below



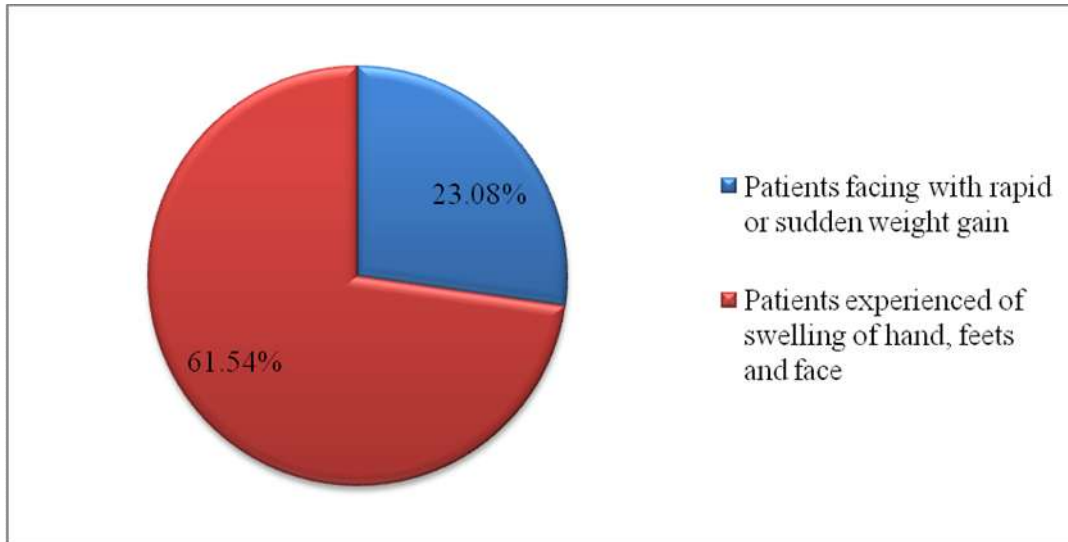
**Figure 4.8:** History of hypertension among the respondent

In case of gestational hypertension 51.11% patient had a previous history of pregnancy hypertension, 24.18% had chronic hypertension.



**Figure 4.9:** Patients experienced with hypertension associated factors

Only 2% of the population had kidney diseases and 20% did the test of being presence of protein in urine.

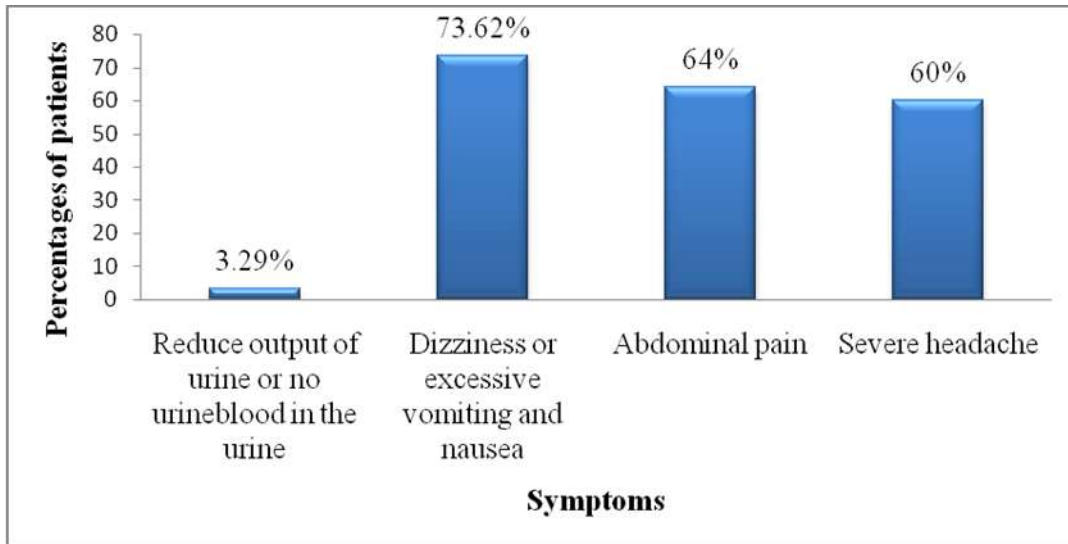


**Figure 4.10:** Patients facing with hypertension related problems

About 23.08% patients were facing with rapid or sudden weight gain and 62% were experiencing of swelling of their hands, feet's and face.

### 4.5.1 Symptoms

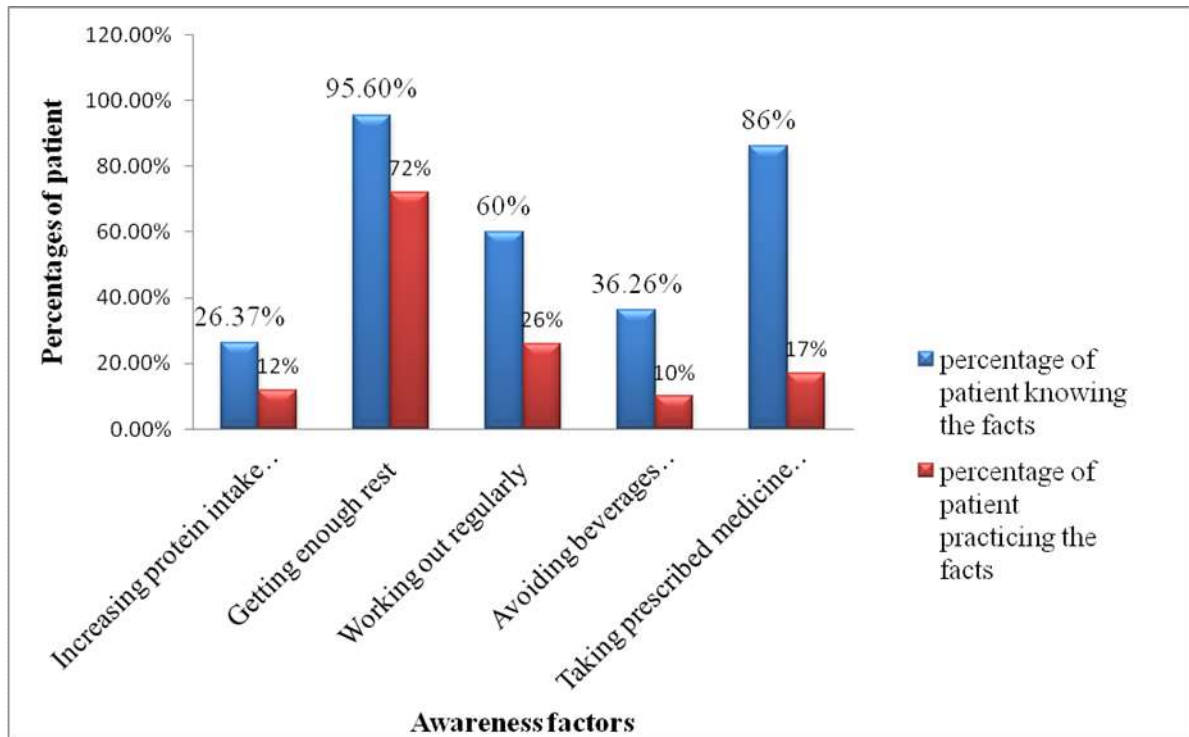
Symptoms that the hypertensive patients experienced are shown below



**Figure 4.11:** Patients experienced various symptoms of PIH

We did not find any patient with spot before the eyes, 3.29% patients had reduction of output of urine or no blood in the urine, majority of the patients (73.62%) had dizziness or excessive vomiting and nausea, 64% had abdominal pain and 60% had severe headache.

#### 4.5.2 Awareness factors

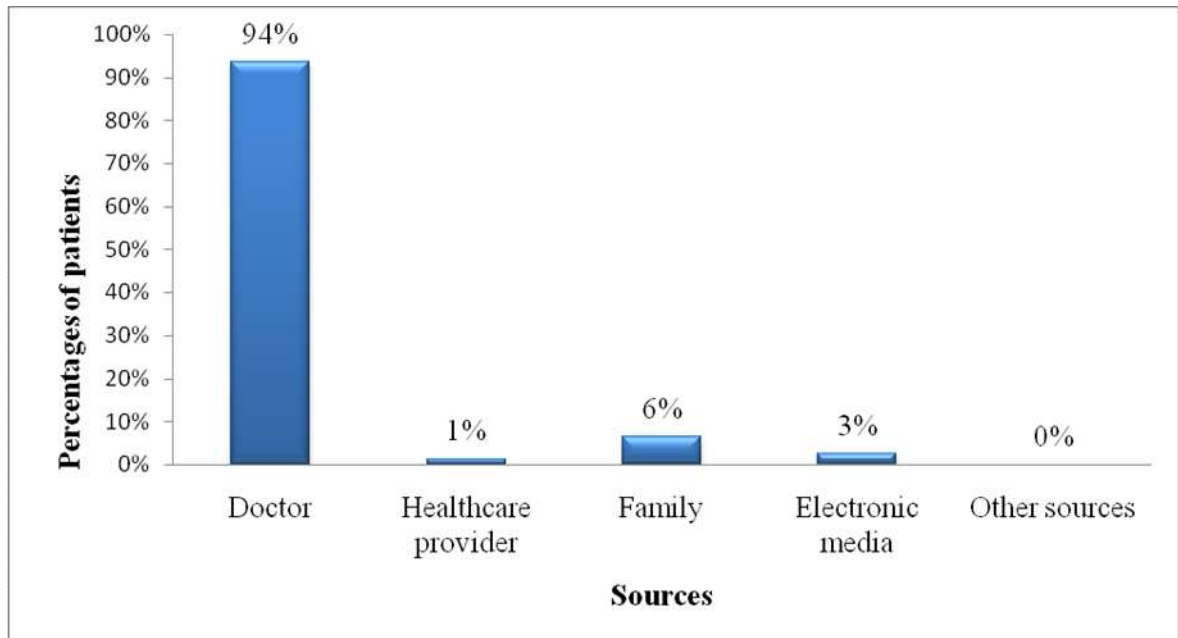


**Figure 4.12:** Deviation in the Percentages of patients concerned about the awareness factors and practicing percentages.

Among the awareness factors the phenomenon of not using of excess salt was known by 98% of patient and almost 100% patient practiced it either knowing or not knowing about this fact. Approximately 95% patients knew the facts of drinking at least 8 glasses of water a day and 85% practiced this. About 26.37% patients knew the importance of increasing the amount of protein intake and decreasing the amount of fried foods and junk foods but the practicing percentages was only 12%. About 95.6% of patients were conscious about getting enough rest but 72% people practiced it. Almost 60% were conscious about working out regularly though 26% practiced it. About 36.26% patient knew to avoid beverages containing caffeine but only 10% practiced. About 86% were aware of taking medicine and additional supplement as the doctor suggested and 74% practiced this. So in the figure we wanted to show the deviation in the percentages of patients concerned about the facts and practicing percentages.

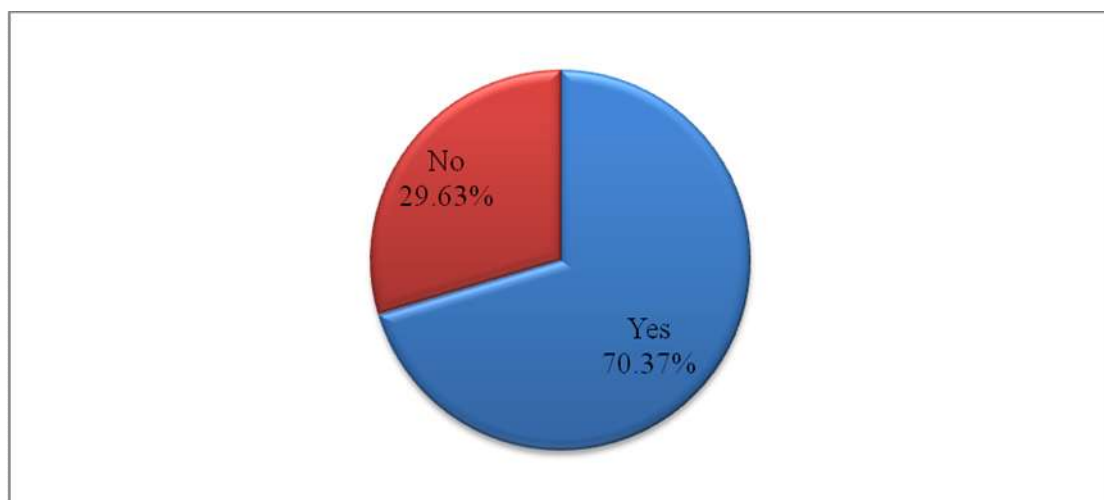
### 4.5.3 Sources of information

Majority of patients knew information about the complication from doctor (100%) and other sources were health care provider (3%), family (19%), and electronic media (1%).



**Figure 4.13:** Sources of information

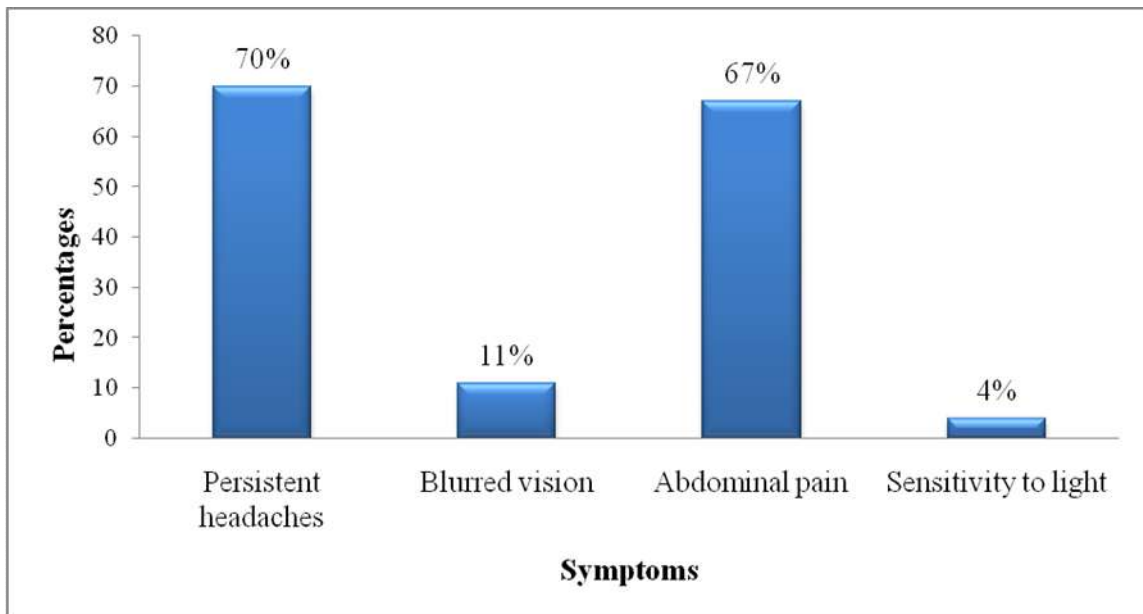
### 4.6 Preeclampsia



**Figure 4.14:** Patients tested positive or negative for protein in the urine

Patients with preeclampsia tested positive for protein in the urine were 70.37%.

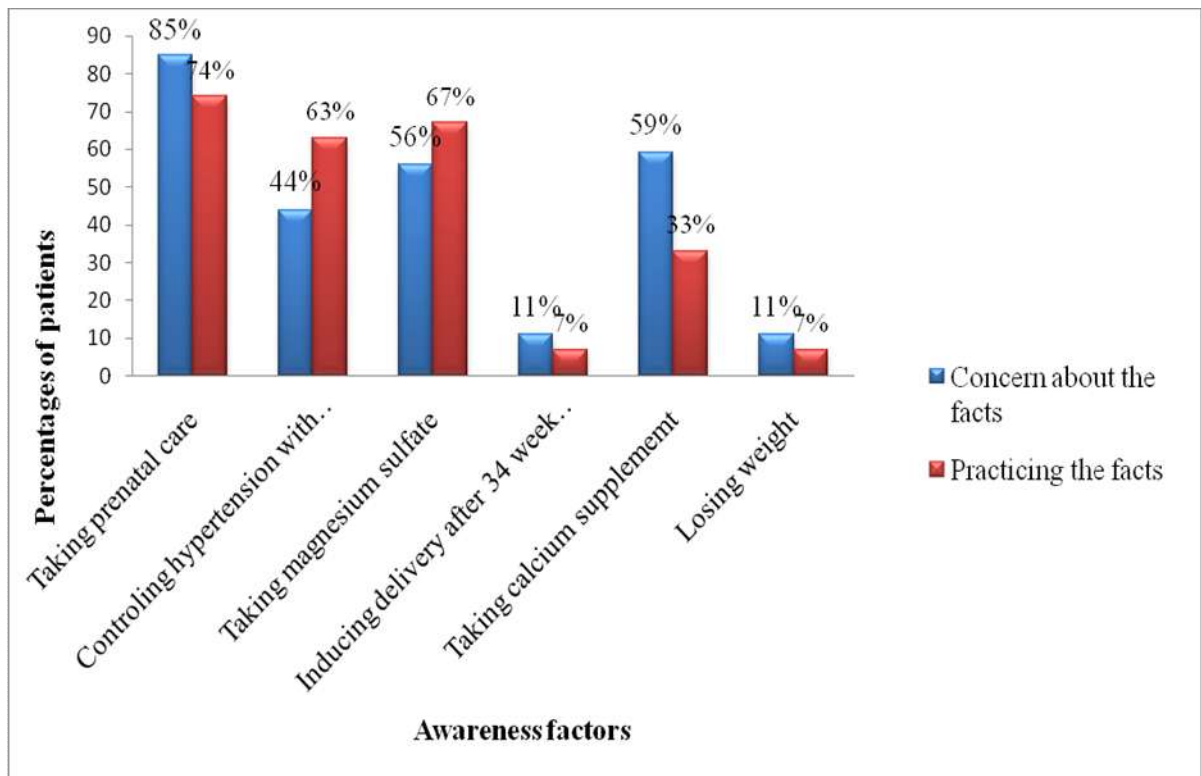
### 4.6.1 Symptoms



**Figure 4.15:** Patients experienced various symptoms

Majority of the patients (70%) had persistence headaches, (11%) had blurred vision, (67%) had abdominal pain, and (4%) had sensitivity of light.

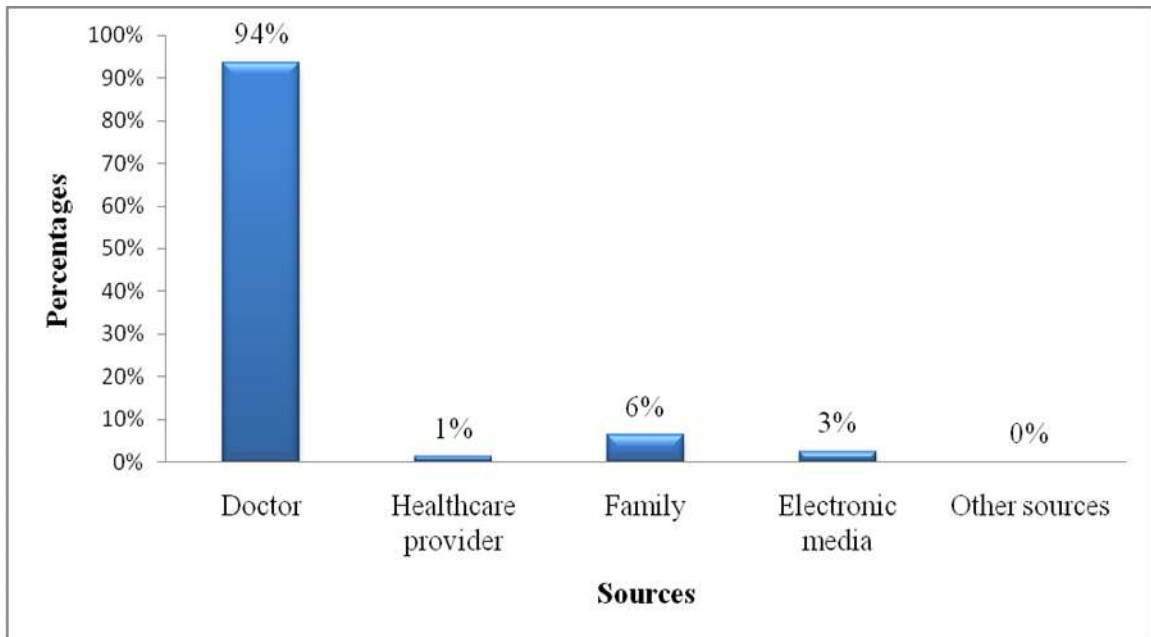
#### 4.6.2 Awareness factors



**Figure 4.16:** Deviation in the Percentages of patients concerned about the awareness factors and practicing percentages

We found that majority of the patients (85%) were concerned about taking prenatal care and 74% were able to practice. About 22% were concerned about maintaining protein level and 19% practiced it. In our recorded data 44% patients knew to control hypertension with nefidipine but 63% practiced it. About 56% concerned about taking magnesium sulphate as the doctors suggested and 67% practiced it. Only 11% patients concerned about inducing delivery after 34 weeks gestation but 7% patients practiced it. About 59% patients known the fact of taking calcium supplement and 33% practiced. Only 4% patients concerned about controlling seizures and 4% maintained it. About the fact of losing weight 11% were concern and 7% patients practiced it.

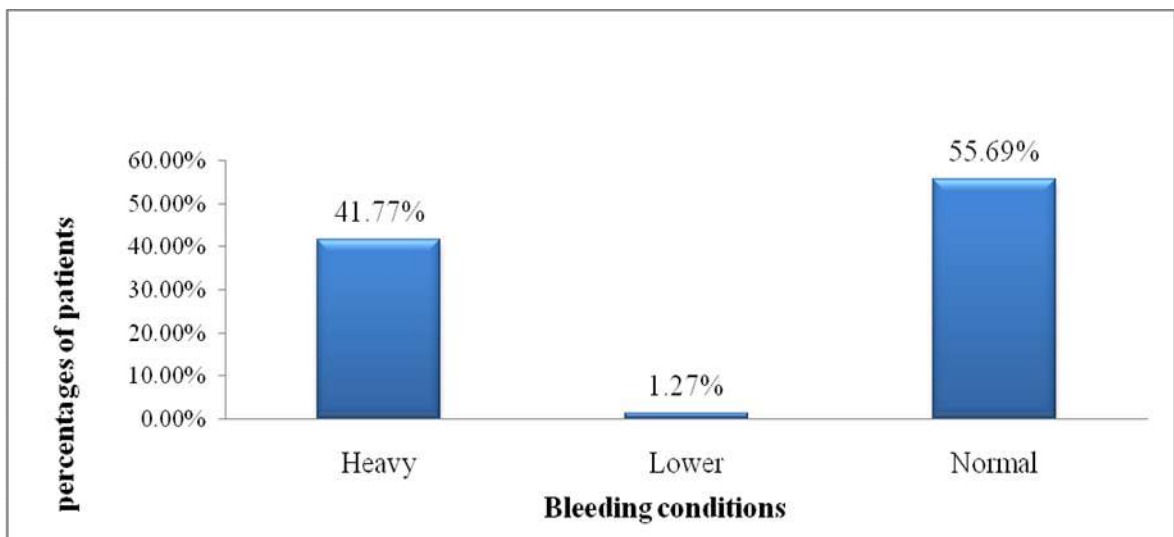
### 4.6.3 Sources of information



**Figure 4.17:** Sources of information

About 96 % patients knew the necessary information's from the doctors.

### 4.7 Anemia



**Figure 4.18:** Bleeding condition of patients during recent menstruation



In case of anemia about 41.77% patient had heavy bleeding, 1.27% had lower bleeding and 55.69% had normal bleeding during recent menstruation before pregnancy.



**Figure 4.19:** The Percentages of patients tested Hct

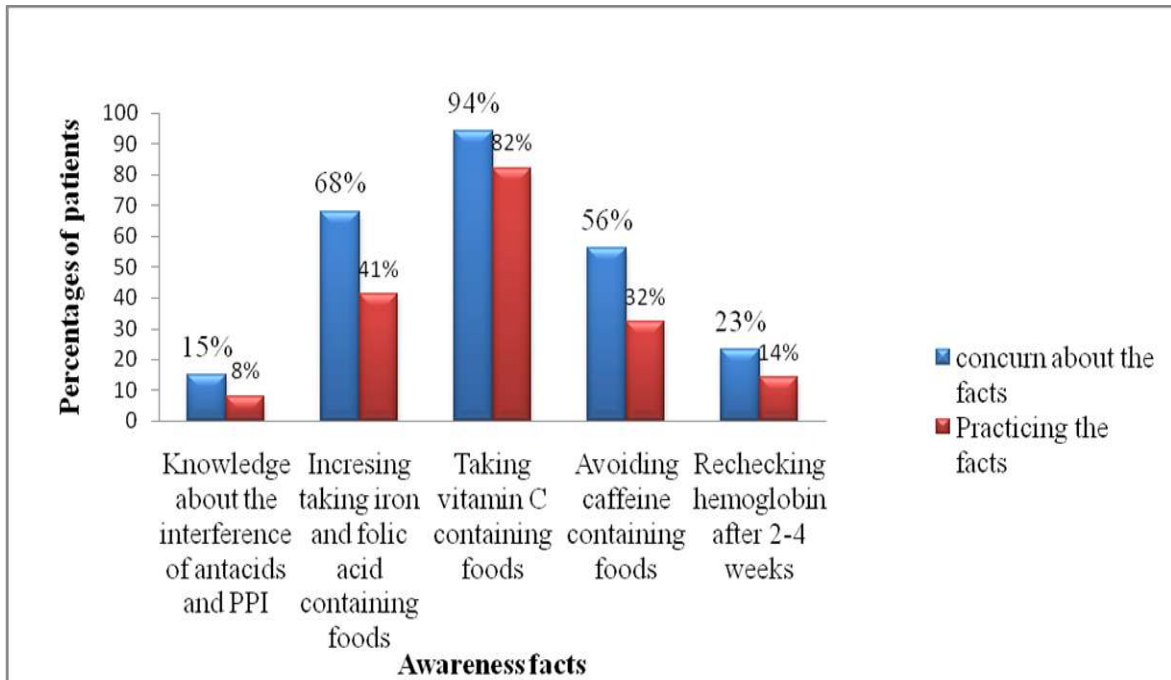
The entire patient with anemia had tested their hemoglobin count and only 5.03% of patients tested their Hct level. We did not find variation in anemia types.

**Table 4.2: Hb count of the sample population**

<b>Classification</b>	<b>Hb level</b>	<b>Patient percentages</b>
Mild anemia	10.0-10.9 gm/dL	2.53%
Moderate anemia	7-9.9 gm/dL	87.34%
Severe anemia	< 7 gm/dL	10.12%

In our study we have found that about 87.34% patient had moderate anemia, 2.53% had mild anemia and 10.12% had severe anemia.

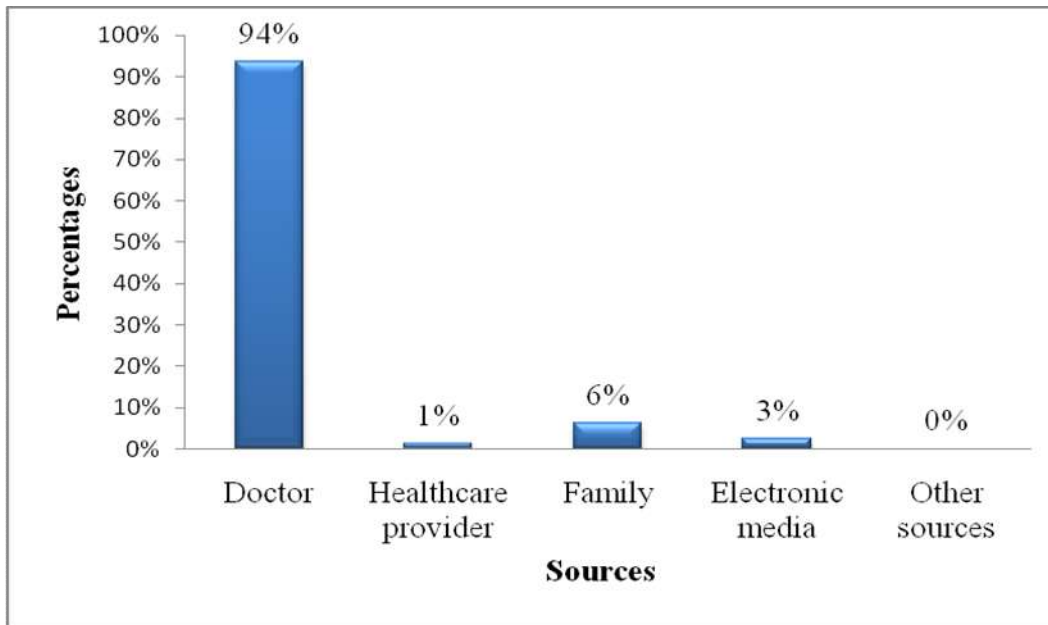
### 4.7.1 Awareness factors



**Figure 4.20:** Deviation in the Percentages of patients concerned about the awareness factors and practicing percentages

Among 79 anemic patients 90% concerned about taking iron or folic acid or vitamin B12 supplement and 92% practiced this fact. About 15% concerned about the interference of antacids and PPIs and 8% practiced it. We have seen that 68% concerned about increasing the amount of iron and folic acid containing foods and animal foods such as meat, eggs, dairy products and 41% practiced the fact. About 94% concerned about taking vitamin C containing foods and about 82% maintained it. Approximately 56% patients were aware about avoiding caffeine containing foods like tea, coffee and only 32% maintained it. About 23% concerned about rechecking hemoglobin after 2-4 weeks and only 14% maintained it.

#### 4.7.2 Sources of information

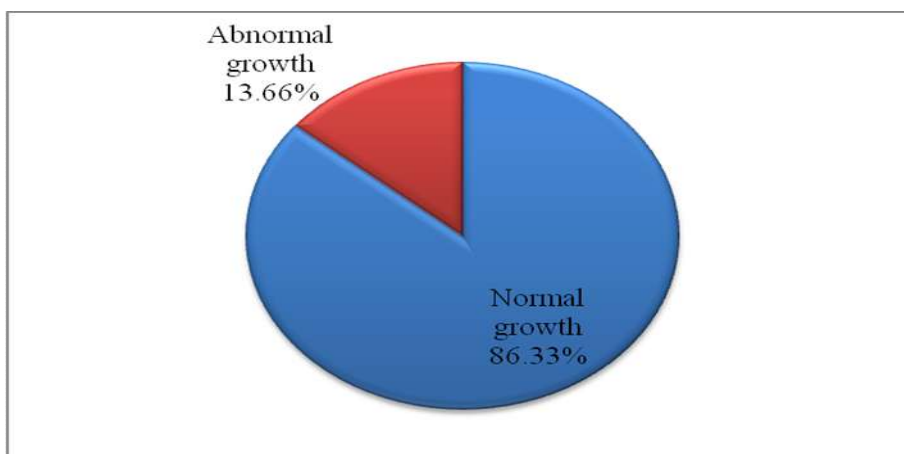


**Figure 4.21:** Sources of information

Maximum patients knew information about the complication from the doctor (94%). Other sources were healthcare providers (1%), family (6%), and electronic media (3%).

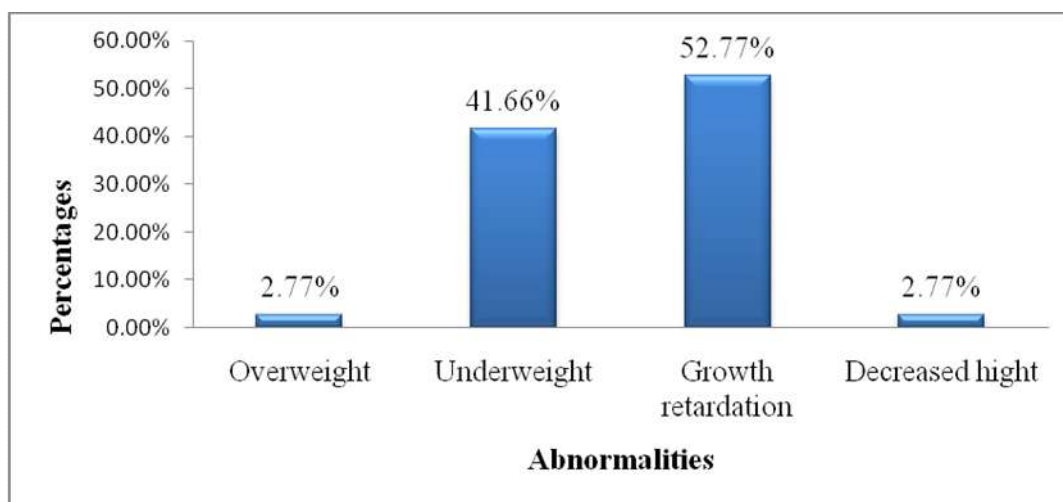
We have found a little number of patients with diabetes 7(2%) and thyroid disorder 4(1.33%).

#### 4.8 Growth of the babies and abnormalities associated with the growth



**Figure 4.22:** Baby's growth condition

Babies with the normal growth were 86.33% and growth of babies that affected by the complications were 13.66%.



**Figure 4.23:** Growth abnormalities among babies

## 4.9 Medication

**Table 4.3: Medication of the respondents**

Sample population status	Medications
Sample population without any complications	Anti inflammatory drugs, Proton pump inhibitors, Pain killer, Antibiotics, Vitamin tablets and supplement, Calcium, Folic acid
Patients with Hypertension	Methyldopa, Hartsol solution, Nefidipine
Patients with Preeclampsia	Hartsol solution, Nefidipine, Magnesium sulfate
Patients with Anemia	Iron supplement, Folic acid supplement, calcium
Patients with Diabetes	Insulin
Patients with Hepatitis	Anti retroviral drug, Antibiotic
Patients with Asthma	Zafirlucast, Lukotrine inhibitors, Inhaled corticosteroid
Patients with Urinary tract infections	Broad spectrum antibiotics
Patients with Thyroid disorder	Levothyroxin

**CHAPTER 5**  
**DISCUSSIONS AND CONCLUSION**

Millions of women in developing countries experience life threatening and other serious health problems related to pregnancy or child-birth. Complications of pregnancy and childbirth cause more deaths and disability than any other reproductive health problems (EC/UNFPA, 2000). The situation is worse in developing countries like ours in Bangladesh due to inadequate access to modern health services and poor utilization and lack of awareness of the population about the complications and also for not likely to practicing some factors that is important to follow in pregnancy.

Our study focused on the percentages of pregnant women suffering from pregnancy related complications among our sample population and also their knowledge about these complications. We then focused on five major complications that are so much common in pregnancy; those were pregnancy induced hypertension, preeclampsia, anemia, diabetes and thyroid disorder. We also focused not only on the knowledge of patients about the awareness factors of the complications but also on their likeliness on practicing those factors that we included in our questionnaire.

Among our total 300 sample population we have found 230(76.66%) women with various complications and only 70(23.34%) were free of any complications. The major complications that we found in this study, were hypertensive disorder (35%), anemia (26.33%) and with hypertensive disorder 81 women had pregnancy induced hypertension, 27 had preeclampsia. So we have seen that major portion of our study population had various complications. Hypertension was mostly prevailed in our sample population that is same with the WHO analysis on maternal death done by Khan *et al* in 2006 (khan *et al*, 2006). This study also support that, the main cause of maternal death in developing countries were hemorrhage and hypertension.

It was found that 51.85% patients had complications with an age range below 20 years. About 75% Patients had complications with age 30 years and above. So very early and older age also enhances the possibility of complications and these are hard to treat.

Pregnant women need to take different drugs during their pregnancy period, especially if a mother suffers from any complications. Many drugs are not suitable for younger mother as the drug may not metabolize or excrete easily due to immature metabolism system, may create toxic metabolite, and may show enhanced side effects. If it comes with pregnancy then it will really difficult for the doctor to prescribe any medication and also for the patient to consume a medicine. In case of older age some medicine may not work properly due to decreased metabolic capacity of the patient or they may need higher doses which can be harmful for the baby in pregnant women.

Teenage pregnancy is associated with maternal anemia, preterm labour, urinary tract infection (Jolly and Sebire, 2000). We have also found that, in our study population among 51.85% teenage mothers with various complications, 22.22% had anemia.

Preterm birth, gestational diabetes, and preeclampsia were more common among older mother (Jacobsson, Ladfors and Milsom, 2004). Our study has shown that among 75% older women with complications, 38.77% had hypertensive disorder.

From the study we found that the women with higher educational status like undergraduate, graduate or post graduate were more conscious about their pregnancy period, complications and also very much positive in taking care of those factors that could minimize the threat to their baby as well as to them. They went to the doctor or consulted with the doctor properly. They also very much concerned about the medication, about their physical activity, about the warning and dangerous signs of pregnancy, about various abortifacient foods. In a word they actually very much concerned about their new baby. On the contrary the sample populations who were not educated or possessed a poor educational background like with primary or SSC or HSC level, maximum respondents did not have pretty much knowledge about their pregnancy period, their new baby and all the stuff related to it. Even they did not know if they had any complication(s) or what the complication(s) was/were. If they gave stillbirth or if they had miscarriage, abortion they even did not know the reasons behind this. They did not concern at all to avoid these situations. But it was a great shock that about 79.99% of the sample population either illiterate or had a poor educational background and only 20.01% had higher educational status. It is also seen that women with poor educational background possessed a lower economic status. So if they wanted to take a proper care to their health as well as to their baby, they could not because of shortage of money. Even they could not give birth to their baby in a hygienic environment.

Hypertensive disorders are the most common medical complication of pregnancy and are an important cause of maternal and perinatal morbidity and mortality in our country. During normal pregnancy, systolic pressure changes little; however, diastolic pressure decreases by an average of 10 mm Hg early in gestation (13 to 20 weeks) and raises again to pre pregnancy levels in the third trimester. The term “hypertension in pregnancy” describes a broad spectrum of conditions in which blood pressure varies widely. In reviewing literature on this subject we have seen that hypertension in pregnancy is defined by office (or in hospital) sBP  $>_{140}$  mmHg and/or dBP  $>_{90}$  mmHg (Magee *et al.*, 2014). So we targeted our patients who had blood pressure same or above 140/90.

Among all the patients we seen majority had 140/90(23.33%), 160/90(10%) and about 64.12% had stage 1 and 28.39% had stage 2 hypertension. This high range of blood pressure may lead to stroke risk.

There are many factors with which the women were more prone to develop hypertension. For examples if a patient had a history of pregnancy induced hypertension or had a history of chronic hypertension or a family relative with a history of hypertension. In this case we had found 51.11% patient with a previous history of pregnancy induced hypertension, 24.18% with chronic hypertension and 48.35% with a family relative with hypertension. We have listed some other related factors which may arise with hypertension. We have found 2.19% patient with kidney diseases, 23.08% were facing with rapid or sudden weight gain, 19.78% have tested urine for presence of protein and 61.54% experienced of swelling of hands, feet and face.

Presence of hypertension can be predicted by noticing some signs or symptoms. In our study we have found that 73.62% patient felt dizziness or excessive vomiting and nausea, 64% had abdominal pain and 60% had severe headache. Though these symptoms are almost similar to the normal pregnancy symptoms, they might be sometimes useful.

Pregnant women with chronic hypertension are at increased risk for superimposed preeclampsia and abruption placenta, and their babies are at increased risk for perinatal morbidity and mortality. The likelihood of these complications is particularly increased in women with long-standing severe hypertension and those with preexisting cardiovascular or renal disease. In addition, fetal and maternal morbidity and mortality are higher than normal when pregnant women have a diastolic pressure of 110 mm Hg or higher during the first trimester (Magee *et al*, 2014). So it is really very important for the patients to control the blood pressure by maintaining some awareness factors. From the statistical analysis of the data we have seen that patients are quite conscious about not using excess salt, drinking at least 8 glasses of water in a day, getting enough rest, working out regularly and taking prescribed medicines and supplements. But they did not practice all this. Highest practicing factors were; not using excess salt, drinking at least 8 glasses of water in a day, getting enough rest and taking the prescribed medications and supplement. Women who did not know this factors maximum were illiterate, had poor educational background, poor economic condition and indifferent in consulting with the doctor in time. As hypertension is very common in pregnancy in our country except doctor they also got information from family, electronic media and other healthcare provider.



Preeclampsia is also a pregnancy-specific disorder that is characterized by new-onset hypertension, proteinuria and vascular dysfunction presenting after the 20th week of gestation. It remains a leading cause of maternal and fetal morbidity and mortality worldwide, and has been recognized as a contributor to future cardiovascular and metabolic dysfunction in affected offspring. By testing proteinuria preeclampsia of the patients can be measured (George and Granger, 2010).

Some symptoms also help to detect preeclampsia like persistence headaches (70%), blurred vision (11%), and abdominal pain (67%), sensitivity to light (4%).

We have seen that about 85% patient concern about taking prenatal care and 75% practiced. Preeclampsia can cause serious problem to the baby. If prenatal care is taken carefully, the baby can be saved by inducing delivery after 34 weeks of gestation.

Patient with this complication should maintain protein level but we have seen only 22% patient concerned about the facts and only 19% practiced it.

It is interesting that 44% patient concerned about controlling hypertension with nifedipine but 63% practiced this as they just maintained the prescribed medication by the doctors.

While reviewing article we have studied that, nifedipine is prescribed in preeclampsia as it can balance the high blood pressure of the patient and also if it is given with magnesium sulfate it will minimize the risk of magnesium related effects (Magee *et al.*, 2014).

In case of magnesium sulphate same phenomenon occurs like nifedipine. About 56% were aware of taking magnesium sulfate and 67% practiced this. We have found in our study that almost all the patient were given magnesium sulfate as it is the most common and safest drug to treat seizures in eclampsia and preeclampsia for pregnant women. It also increased the length of labour (Sibai, 2005).

Only 11% patient were aware about inducing delivery after 34 weeks but 7% patient practiced it to avoid any harm to the baby with longer pregnancy duration.

Low dose of calcium is useful to prevent preeclampsia was known to 59% of patients and practiced by 33%.

Seizures are life threatening for both mother and fetus but 4% patients concerned and practiced controlling the seizures.

A recent study found that women with preeclampsia who lost even a small amount of weight before their next pregnancy were less likely to develop preeclampsia again. So losing weight is an important factor that was known by 11% and practiced by 7%.

This two hypertensive disorder is highly related with the growth abnormalities of the baby. Resulted data shows that 9.25% babies had underweight and 7.40% had growth retardation. Placental insufficiency and inadequate blood supply to the placenta is the reason for fetus growth abnormalities (George and Granger, 2010).

Another major complication we have found in our sample population was anemia. We have found 79(26.33%) population with anemia among which 41.77% had heavy and 55.69% had normal bleeding condition during recent menstruation before pregnancy. It has been shown in many studies that, heavy bleeding during recent menstruation before pregnancy is one of the main reasons of anemia. But in our study (55.69%) patient had normal bleeding during recent menstruation before pregnancy. The reason for anemia in these women may be their malnutrition and lack of knowledge about nutrition that is shown in study done by Ahmed *et al* in year 2012 (Ahmed *et al*,2012).

We have seen that in case of anemia doctors tested the hemoglobin level of all the patients rather than the Hct level (5.03%). Majority of the patients had 8g/dL Hb level where <10g/dL is considered as anemia which is supported by the study of WHO. For every patient of anemia in our study doctors prescribed it as anemia for mixed causes, they did not individualize anemia according to its types. So the patient would understand the complication easily.

The awareness factors that we included in our questionnaire were very important for the anemic patients as anemia often develops during the later stages of pregnancy even in women who enter pregnancy with relatively adequate iron stores (Allen, 2000).

About 90% patients we found were concern about taking iron or folic acid or vitamin B12 supplement and 92% practiced this.

Patient should also increase the consumption of foods containing iron and folic acid and also other foods like meat, eggs, and dairy products. About 68% patients were concerned and 41% practiced the fact.

From recent studies it is seen that long term use of antacids or PPI can decrease the amount of vitamin B12 in the body (Jensen, 2006). But only 15% patients were concern about the interference of vitamin B12 and antacids or PPI and 8% practiced.

As vitamin C enhances the absorption of dietary iron (Fishman, Christian and West, 2000), doctors highly prescribed vitamin C. We have also found high percentages of patients (94%) were aware about taking vitamin C and 82% maintained it. Foods that contain caffeine should be avoided by the patients as it decreases the absorption of dietary iron.

Every patient should recheck hemoglobin after 2 or 4 weeks to see if the hemoglobin level is appropriate or not. Patients with low hemoglobin level are very much prone to deliver a low birth weight baby. Our study has shown that about (11.39%) baby were suffering from various growth abnormalities in anemic patients, among them most of had underweight (6.32%) that is supported by the study done by Rasmussen in year 2001.

In case of anemia about 93.67% patient had their information from doctor. Other sources were healthcare provider, family.

We think, for better understanding about the condition of pregnant women in our country this study should be done on a handsome number of populations not only in Dhaka city but also at other districts in Bangladesh. In those study we can include the women who are going to be pregnant, or non pregnant, that will help this women to become conscious before they go through this stage.

### **Conclusion:**

Pregnancy related complications are still major problems in Bangladesh even though Bangladesh is well on its way towards achieving the Millennium Development Goal 5 (Improving maternal Health). Due to lack of proper facilities, awareness and education on these complications are extremely important to improving maternal health further.

CHAPTER 6  
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