CHAPTER I
INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Pregnancy is an important event, one of the great honors and God’s gift to woman, for this woman is respected everywhere. It is surrounded by many positive values ranging from enhancement of the self esteem to social approval. The highest value placed on the woman in most societies is the role as mother which make the motherhood as central to woman’s life. Pregnancy and childbirth is a great event in the life of every woman for which she aspires and longs for, with great expectation. She has fantasies about pregnancy and motherhood.

Pregnancy is a time of growth and hope. Pregnancy is not only a biological event but also an adaptive process. This period is a time of physical and psychological preparation for birth and parenthood. Pregnant woman perceive it as a period of happiness in anticipation of motherhood. Becoming a parent is considered as one of the maturational milestones of woman’s life. Pregnant woman carry the fetus safely through to delivery and adjust to sacrifices the motherhood demands. Women hope for a smooth journey in pregnancy without any complication and a normal fetal development.

Pregnancy is a state of carrying one or more off springs, known as an embryo or fetus inside the womb of a female. Pregnancy is a period of profound physical and physiological transformation. Many changes in maternal physiology occur during this period. Even though these are more apparent in the reproductive organs it involves other system such as in the cardiovascular, hematologic, metabolic, renal and respiratory, endocrine systems too. Maternal physiological changes in pregnancy are the normal adaptations that a woman undergoes.
during pregnancy to better accommodate the embryo or fetus and ensures the fetus grow properly and receives adequate nutrition.

Pregnancy is a complex phenomenon which includes physiological, psychological and social changes, especially for the first one. It is always related with changes in psychological functioning of pregnant women and associated with ambivalence, frequent mood changes, varying from anxiety, fatigue, exhaustion, sleepiness, depressive reactions to excitement as pregnancy causes many changes in body appearance, affectivity and sexuality. Pregnancy is identified as a potent stressor. Even thoughts of pregnancy can bring about numerous worries about its course and outcome, and especially of the delivery itself, which may be so intense that they acquire features of phobia called tocophobia. (Bjelica, Kapor Stanulovic 2004).

The psychological changes also depend upon whether the pregnancy was planned or unplanned, wanted or unwanted, becoming pregnant after a long period or after medical intervention like IVF, changes in the role, changes in the relationships, fear of being a good parent, fear of problems associated with the pregnancy or the baby, fear of childbirth and lack of support and being alone, the amount of help the couple might expect to receive in raising the child, the type of relationship whether stable or transient with the partner, pressure from the partner or family to become pregnant.

Life stress, perceived social support in relations between stress and symptoms during pregnancy reveal influences of socio-demographic factors (i.e., socioeconomic status, age, parity), stress (partner conflict and life events), and social support on symptoms of anxiety and depression. Women who reported low levels of social support showed stronger relations between stress and symptoms
than women who reported high levels of social support, indicative of a mediating effect of social support, (Glazier, Elgar, Goel, Holzapfel, 2004)

During pregnancy many changes occur in women's self-concept. Women may feel having lost some control over their lives. The changes in their self-image and the shift in focus from themselves to the needs of the fetus and unfamiliar territory of pregnancy and early motherhood creates stress. As first-time mothers start to undergo a transition at in their pregnancy, they face difficult periods both early in the pregnancy and after the birth, and have unmet need for support in those periods, (Darvill, Skirton, and Farrand, 2010).

The neuroendocrine mechanism play an important role in physiology of stress during pregnancy. The increased production of several stress hormones, including adrenaline and cortisol, enable the mother to cope with stress caused by the physiological changes which occur as a normal part of pregnancy induced physiological stress. As long as these remain within manageable parameters, they contribute to the well-being. When the parameters are exceeded, they become stressors, involving the alarm or flight-or-fight response, the resistance and the exhaustion stages. The resistance stage causes an increase in production of endocrine hormones such as cortisol and thyroxin, which maintain the adjustment to the continued presence of the stress. The exhaustion or ‘burnout’ stage occurs when these resources are exhausted, eventually weakening several body systems increasing morbidity and mortality.

Cardiovascular and neuroendocrine play an important role in stress process and predicts the health outcomes. Greater magnitude and duration of physiological responses have been associated with increased risk of hypertensive disorders and diabetes, greater susceptibility to infectious illnesses, suppression of cell-mediated
immunity as well as risk for depression and anxiety disorders. Stress reactivity during pregnancy has unique implications for maternal health, birth outcomes, and fetal development. (Christian, 2012)

Raised blood cortisol over a prolonged period leads to hyperglycaemia and glycosuria, causing lethargy and tiredness and are associated with the ketosis and severe weight loss of hyperemesis gravidarum, which is often attributed to psychological stress. (Leylek, Toyaksi, Erselcan and Dokmetas Leylek, 1999). Significant raised catecholamines and cortisol levels may also lead to spontaneous abortion during the first trimester (Philipp Brede, Hadmek, Gessler, Lohse and Hein, 2002) or preterm labour (Stenson, 2003). ACTH stimulates production of mineralocorticoids, particularly aldosterone, which facilitates re-absorption of sodium, under the influence of chemoreceptors, promoting passive reabsorption of fluid from the renal tubules to maintain a stable fluid volume. Aldosterone increases significantly towards term, raising blood pressure and fluid retention (Langer Grima Coquard Bader, Schlaeder and Imbs, 1998) ultimately leads to preeclampsia (Hartley, 1998). Fetal growth and well-being may also be compromised.

The normal physical and psychological discomforts of pregnancy may be exacerbated by the “fight or flight” response to excessive stress, in which tension, headache, muscle spasms, insomnia, fatigue and loss of concentration occur (Selhub, 2002). Resulting tiredness and sleep deprivation cause a resort to inappropriate coping strategies such as smoking and alcohol consumption.

Serotonin (5-Hydroxytryptamine), a neurotransmitter in the cerebral cortex, hypothalamus, limbic system and in circulating platelets, is associated with mood
changes, pain appreciation, sexual activity, appetite, endocrine and cardiac functions which are all affected during pregnancy. Significant reduction in serotonin levels have been implicated in gestational depression (Shetty and Pathak, 2002).

Anxiety is a dimension of stress (Brown, 2001) that occurs in response to internal and external stimuli. Anxiety is generally considered to occur in two subtypes: State and Trait. State anxiety refers to transitory feeling of apprehension, tension or worry. This feeling vary in intensity, often have an identifiable event contributing to the feelings and the anxiety fluctuates over time. Trait anxiety is described as a condition of anxiety that is prevalent, stable over time and less likely to be associated with a specific triggering event.

Anxiety can arise when the expectations are not met. During pregnancy the anxiety occur when the expectation of a normal pregnancy culminating in the delivery of a healthy baby is threatened. The extent of anxiety during pregnancy is determined by a combination of a degree of awareness and the magnitude of their unmet needs. Andersson, Poromaa, Wulff, Astrom Bixo (2004) identified association between anxiety and / or depression and increased nausea, vomiting, prolonged sick leave during pregnancy and increased number of visits to the obstetrician, specifically visits related to fear of child birth , planned cesarean delivery and epidural analgesia during labor are common in women with anxiety or/ depression.

In the study of Smith, Crowther, Beilby and Dandeaux(2000) nausea was identified as the most troublesome symptom during pregnancy. It was associated with low scores for the SF-36 for all items, particularly physical functioning, energy and social functioning. The women described substantial effects on
working, household duties and parenting activities. Findings from this study suggest nausea and vomiting in early pregnancy has a profound impact on women's general sense of well-being and day to day life activities.

Untreated anxiety and stress in pregnant women cause deleterious effects. They can lead to poor maternal health behaviors such as substance abuse, poor eating, sleeping, exercising habits. Impaired maternal fetal attachment (Lindgren 2003) and poor neonatal outcome such as higher blood cortisol and norepineprine levels and delayed neurobehavioral development of the newborn (Lundyet, 1999).

Maternal stress and anxiety were found to be the predictors of adverse pregnancy outcomes including low birth weight and prematurity. Villar (2007) reported that consistent increase in the frequency of IUGR, preterm delivery and LBW were noted among the infants of women with high baseline levels of psychological distress and low levels of social support.

Norbeck and Anderson (1989) identified that combination of high life stress and low partner support was associated with the highest anxiety. The findings confirmed that mid-pregnancy measures of these psychosocial variables were valid indicators of their level over the course of the remainder of the pregnancy, allowing for early assessment and intervention to improve perinatal well-being.

Risa, Weisberg, Juliez and Paquette (2002) found that untreated anxiety disorders during pregnancy and the postpartum period may pose significant risks to the unborn fetus and interfere with a mother’s ability to properly care for her newborn child. As the symptoms of anxiety disorders are often similar to those found in pregnancy, careful screening for anxiety disorders in pregnant women is
essential. For women suffering from anxiety disorders during or after pregnancy, safe and effective treatment is needed.

The medication used to treat the anxiety during the pregnancy are serotonin reuptake inhibitors (SSRIs), including paroxetine, sertraline, and fluvoxamine, benzodiazepines and anti depressant. But medication during pregnancy is associated with three primary effects. Those are teratogenicity, perinatal syndromes (neonatal toxicity), and postnatal behavioral sequelae. Since drugs pass through the placenta producing potential implications for the developing fetus, the risk for teratogenicity occurs in the first 12 weeks of gestation. A meta-analysis performed by Altshuler Cohen, and Szuba (1996) noted that the increased risk of cleft lip and palate was associated with use of benzodiazepines.

Perinatal syndromes are associated with the use of anxiolytics. Women have been exposed to SSRIs during third trimester pregnancy leads to withdrawal syndromes in infants. Symptoms included jitteriness, irritability, tremulousness, myoclonus, difficulty feeding and sleeping, hypotonia/hypertonia, hypothermia, tachypnea, and seizures. Third-trimester benzodiazepine use causes a “floppy baby” syndrome, characterized by low Apgar scores, hypothermia, muscular hypotonia, and sluggish response to cold temperature. Symptoms associated with benzodiazepine withdrawal include hypertonia, hyperreflexia, excessive crying, tremors, bradycardia, restlessness, irritability, seizures, abnormal sleep patterns, and cyanosis. These effects have been seen for several months after birth and vary depending upon the amount and length of inutero exposure.

Postnatal neurobehavioral sequelae, includes low IQ for inutero exposure to fluoxetine. The benzodiazepine exposure lead to deviant motor development at
6 months, 10 months and 18 months of age, and also children demonstrated delays in mental development quotients and social, hearing, and speech subscales (Laegreid, Olegard and Walstrom, 1989) reported adverse reaction for the women are also associated with medication, one third of patients taking SSRIs will gain weight. The incidence of headache in SSRI trials is 18% to 20% and cause trouble with sleeping or excessive somnolence and rarely associated with platelet dysfunction or hyponatremia. Abrupt discontinuation of venlafaxine or SSRIs (except fluoxetine) produces a discontinuation syndrome consisting of nausea, somnolence, and insomnia. Use of psychotropic medications during pregnancy is weighing of risk vs benefits.

According to American Psychiatric Association, (1994) tension of some kind and difficulty relaxing are implicit in the DSM-IV generalized anxiety disorder (GAD) and panic disorder (PD). The criteria for GAD state that the patient may be restlessness or feeling keyed up or on edge and may experience muscle tension and sleep disturbance. These criteria would entail heightened activation of sympathetic nervous system.

According to MGH centre for women’s mental health (2007) Cognitive-behavioral therapy and relaxation techniques may be very useful for treating anxiety symptoms during pregnancy and may reduce the need for medication as pharmacological interventions produces consequence on the course of the pregnancy and the development of the foetus and children.

The common non pharmacological therapies given during antenatal period to alleviate stress and anxiety are massage, muscle relaxation, breathing technique, aroma therapy, herbal therapy, yoga, guided imagery, meditation and psychotherapy. Since these therapies enhance individuals' adaptive responses to
chronic stress by increasing awareness and decreasing the physiological, emotional, cognitive, and behavioral effects of the stress response (Park, 2013)

Progressive muscle relaxation therapy is an effective and widely used mind-body interventional strategy for stress and anxiety relief. It is a therapy with tensing and relaxation of muscle groups. It was developed by Chicago physician Edmund Jacobson in the year of 1934. The contraction of skeletal muscle fibers leads to the sensation of muscle tension, the result of a complex interaction of the central and peripheral nervous system with the muscular & the skeletal systems and relaxation occur during the absence of perceived muscle tension. The sympathetic and parasympathetic nervous systems often work reciprocally in that elevated activation of one leads to deactivation of the other. Sympathetic activation is called the ergotropic or ‘fight or flight’ response, Parasympathetic activation has been called the relaxation response or trophotropic in that it promotes rest and repair. Parasympathetic responses include reductions in HR and BP, stress and anxiety (Conrad and RothWalton, 2007).

Bodee and Lee (2008) examined published evidence on the effectiveness of mind-body intervention during pregnancy on perceived stress, mood and perinatal outcome. Computerized searches of PubMed, Cinahl, PsycINFO, and the Cochrane Library with Twelve out of 64 published intervention studies between 1980 and February 2007 of healthy, adult pregnant women met criteria for review. Studies were categorized by type of mind-body modality used. Progressive muscle relaxation was the most common intervention. Other intervention are multimodal psychoeducation approach or a yoga and meditation. Treatment group outcomes included higher birth weight, shorter length of labor, fewer instrument-assisted births, and reduction of perceived stress and anxiety. Evidence support that
pregnant women have health benefits from mind-body therapies used in conjunction with conventional prenatal care.

The importance of muscle relaxation is to de-stress the body and mind. The advantages of progressive muscle relaxation includes lowering of the blood pressure, lowering of the muscle tension, the level of anxiety, fatigue and providing a sense of overall well being (Carl Son, Hoyle 1993). Practice of progressive muscle relaxation assist in relieving muscle tension, greatly improve overall feeling of well being and most importantly, reduce stress and anxiety during pregnancy and make the pregnancy as joyous one.

1.2 NEED FOR THE STUDY

Maternal mortality estimates confirm that the number of women dying in pregnancy and childbirth is declining. Along with other indicators, the joint U.N. report validates the fact that there is progress in saving mothers’ lives. The progress is due to the government’s strategic approach to the safe motherhood challenge by deploying trained midwives, ensuring adequate essential supplies, making family planning accessible and providing timely obstetric care to women with complications. Trends in maternal mortality from 1990 to 2010 reveals that the maternal deaths have halved in 20 years, the annual number of maternal deaths dropped from more than 543,000 to 287,000 a decline of 47 % (WHO, 2012).

With declining rates of maternal mortality worldwide, there is recognizing importance of addressing morbidity as well. The contributions of maternal mental health to maternal morbidity are enormous. In recent decades, psychological morbidity in child-bearing women in particular has received increasing research
attention because of its ramifications on the mother as well as her child (Fisher 2009).

Maternal mental health problems pose a huge human, social and economic burden to women, their infants, their families and society and constitute a major public health challenge. The overall prevalence of mental disorders is twofold higher in women when compared to men, women’s mental health requires special considerations in view of women’s greater likelihood of suffering from depression and anxiety disorders and the impact of mental health problems on childbearing and childrearing too. (WHO, 2008).

During pregnancy women experience some degree of stress, anxiety and fear regarding their own health and that of their babies, as well as the approaching labour and worries about social, financial, occupational and relationship issues. The significant increase in the levels of stress hormones may compromise the health of both mother and fetus. Mental health during pregnancy and postpartum are distressing and may have greater impact than the problems that occur at other point of time in women’s life. (NICE, 2007).

Dumas Reid, Wolfe, Griffin (2005) estimated the prevalence at various risk factors for the occurrence of stress during pregnancy among women’s, stress was at very high level in primi mothers than in multi mothers with a mean of 62.81% and 54.3%. Stress was progressively worse over time; Women in rural areas were less likely to develop stress during pregnancy. According to Rondo,Ferreira, Nogueira, Ribeiro, Lobert and Artes (2003) the prevalence of stress and distress during pregnancy varied from 22.1% to 52.9% at Brazil. At
Washington, 78% had low-moderate, 6% had high stress during pregnancy (Sarah Woods Melville, Guo, Fan and Gavin, 2010).

Table 1. Prevalence of anxiety during pregnancy

<table>
<thead>
<tr>
<th>Prevalence of anxiety during pregnancy</th>
<th>Country</th>
<th>Author</th>
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<tbody>
<tr>
<td>54 % Antenatal anxiety , 37.1% Antenatal depression</td>
<td>Hong Kong</td>
<td>Lee (2007)</td>
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<tr>
<td>59.5 % state anxiety and 45.3% trait anxiety</td>
<td>Sao Paulo, Brazil</td>
<td>Faisal-Cury (2007)</td>
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<td>39.0% pregnant &amp; 16.3% in the non-pregnant</td>
<td>Nigeria</td>
<td>Adewuya et al. (2006)</td>
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<td>29% Antenatal anxiety &amp; 18% Antenatal depression</td>
<td>Bangladesh</td>
<td>Hashima (2011)</td>
</tr>
<tr>
<td>11.4% and 17.4% Antenatal anxiety</td>
<td>Ghana and Ivory</td>
<td>Bindt et al. (2012)</td>
</tr>
<tr>
<td>18% Antenatal anxiety</td>
<td>Pakistan</td>
<td>Karmalin et al. (2009)</td>
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<tr>
<td>14.8% and 14.0% pre and postnatal anxiety</td>
<td>Africa</td>
<td>Sawyer (2010)</td>
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<tr>
<td>14.6% Antenatal anxiety</td>
<td>Hungary</td>
<td>Bodecs (2009)</td>
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<tr>
<td>13.1%; 12.2%; 18.2%; 18.6%; 4.7% high level of anxiety(STAI-S≥45) during I,II,III trimester and 3rd month postnatal period.</td>
<td>Portugues</td>
<td>Barbara (2011)</td>
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Three-factor model of pregnancy anxiety was found reflecting 'fear of giving birth', 'fear of bearing a handicapped child' and 'concern about one's appearance. Pregnancy anxiety should be regarded as a relatively distinctive syndrome. Its measurement enables researchers and clinicians to address issues
of prediction, identification and risk reduction more precisely and perhaps more effectively (Huizink, Mulder, Robles de Medina, Visser, Buitelaar (2004).

Antenatal stress and anxiety causes varied effect on mother and child. Mary Coussons, Okun, Schmitt and Giese (2005) found that high social support was associated with low stress scores. Elevated stress scores were positively correlated with higher levels of the proinflammatory cytokines IL-6 and TNF-α, and with low levels of the antiinflammatory cytokine IL-10. These findings support the hypothesis that stress-related neural immune interactions may contribute to pregnancy complications and poor outcome.

Boyles, Sarah Ness, Grisso, Jeane Ann, Markovic, Nina, Bromberger, Joyce, CiFelli and Denise (2000) found that life event stress is associated with an increased risk of spontaneous abortion. Spontaneous abortion at 11 weeks or greater was associated with more life event stress, stress increases the risk of chromosomally normal spontaneous abortion.

Chou, Avant, Kuo and Fetzer (2007) examined the relationships between nausea and vomiting with perceived stress, social support and maternal psychosocial adaptation among Taiwanese women during early pregnancy. Severe pregnancy related nausea and vomiting was associated with high-perceived stress levels.

Harville, Savitz, Dole, Thorp and Herring (2007) investigated the relationship between stress and risk of bacterial vaginosis (BV) in pregnant women. The stress measures of state anxiety (OR=2.0, 95% CI 1.2-3.3), perceived stress (OR=2.4, 95% CI 1.5-3.9) and total life events stress (OR=2.0, 95% CI 1.3-3.2) had the highest risk of BV. Even after Adjusting confounders, especially age, race, and income (state anxiety: OR=1.3, 95% CI 0.7-2.4; perceived stress:
OR=1.4, 95% CI 0.8-2.5; total life events: OR=1.3, 95% CI 0.7-2.4). Presence of BV before 20 weeks of gestation was an independent risk factor for delivery of an infant with low birth weight, preterm delivery of a low-birth weight infant and clinical chorioamnionitis. (Svare, Schmidt, Hansen and Lose, 2006).

Kelly, Russo and Katon (2001) identified that antenatal anxiety and depressive disorders were associated with an amplification of physical symptoms of pregnancy. Eliciting and tracking somatic symptoms during prenatal visits could potentially improve detection of depressive and anxiety disorders in the obstetrical sector.

Hall, Hauck, Carty, Hutton, Fenwick and Kathrin Stoll (2009) studied the relationship between childbirth fear, anxiety, fatigue, and sleep deprivation in pregnant women revealed that 25% of women reported high levels of childbirth fear and 20.6% reported sleeping less than 6 hours per night. Childbirth fear, fatigue, sleep deprivation and anxiety were positively correlated. Women with high childbirth fear were more likely to have more daily stressors, anxiety, and fatigue.

Kurki, Hiilesmaa, Raitasalo, Mattila, and Ylikorkala (2000) did a study among 623 nulliparous singleton pregnant women at 10 to 17 weeks and delivery to find the prevalence of anxiety, depression and development of preeclampsia. The prevalence of anxiety and depression was 16% and 30% respectively. Out of 16% women with anxiety 28(4.5%) developed preeclampsia. Both anxiety and depression was associated with increased risk for preeclampsia.

Monk, Myers, Sloan, Ellman, Fifer (2003) found the changes in fetal behavior with acute changes in women's cardiovascular activity after psychological stress and women's anxiety status. This indicates that variations in women's
emotion-based physiological activity can affect the fetus and may be centrally important to fetal development.

Teixeira, Nicholas and Vivette (1999) identified that women who were anxious during pregnancy had significantly abnormal pattern of blood flow through the uterine arteries. In the most anxious group 27% had an increased uterine artery resistance index of clinical concern, compared to 4% in the less anxious group. The influence of maternity anxiety may be one mechanism by which the intrauterine environment contributes to later disease in offspring.

Field Diego Hernandez-Reif, Gil and Vera (2005) studied the pregnant women (N = 131) at a prenatal ultrasound clinic between 20 and 28 weeks (M = 24 weeks) gestation. The women were assessed for CES-D for depression and the State-Trait Anxiety Inventory and urine sample to assess cortisol, norepinephrine, epinephrine, dopamine, and serotonin. Fetal activity and fetal weight were estimated by ultrasound. Regression analyses revealed that prenatal cortisol as a significant predictor of fetal activity and estimated fetal weight.

Racheal Gitau, Fisk and Glover (2001) found evidence from human studies that anxiety or stress during pregnancy can affect birth outcome, causing babies to be born earlier and possibly smaller for gestational age. Animal studies indicate that antenatal stress does have a long-term effect on the behaviour of the offspring, including a hyper-responsive hypothalamo-pituitary-adrenal axis. The human foetus can mount an independent stress response from mid-gestation. Two possible mechanisms have been demonstrated by which maternal stress or anxiety may affect the human foetus, the passage of cortisol across the placenta, and an impairment of blood flow through the maternal uterine arteries.
The comprehensive array of psychosocial factor affecting pregnancy includes the life events, social support, pregnancy-related anxiety, depression which may lead to preterm birth initiated by labor or ruptured membranes. (RR = 3.0, 95% CI: 1.7, 5.3) (Dole, Picciotto, Riz, McMahon and Buekens 2003).

Reis, Fadalti, Florio and Petraglia (1999) estimated the plasma corticotrophin-releasing factor levels are low in non pregnant women and become higher during the second trimester of pregnancy, rising steadily until about 35 weeks, and then increasing more rapidly until term. Increased maternal plasma corticotrophin-releasing factor levels characterize some gestational diseases. Women with chronic hypertension and preeclampsia have high corticotrophin-releasing factor levels leads to intrauterine growth retardation. The role of corticotropin-releasing factor in preterm labor is uncertain, but midgestational plasma corticotrophin-releasing factor levels may be higher in women delivering preterm. The endocrine-paracrine corticotropin-releasing factor/corticotropin-releasing factor-binding protein pathways may play a major role in the mechanism of human parturition.

Zhou and Li (2011) elicited that prenatal anxiety may lead to increased rate of non-indicative cesarean section and intrapartum hemorrhage during the cesarean section. The factors have contributed to the anxiety level of the pregnant, such as psychological stress, relationship with mother-in-law, number of abortions, prenatal health conditions, times of attending classes for pregnant women, psychological preparation for childbirth, relationship with mother and relationship with husband.

Alder, Fink, Bitzer, Hösl i and Holzgreve (2007) did a meta analysis to identify the elevated levels of anxiety and depression and its association with
obstetric outcome such as obstetric complications, pregnancy symptoms, preterm labor and pain relief during labor, fetal and neonatal well-being and behavior. The study concluded that enhanced levels of anxiety and depression symptoms during pregnancy contribute independently of other biomedical risk factors to adverse obstetric, fetal and neonatal outcome.

Diego, Jones, Field, Reif, Schanberg, Kuhn, and Gonzalez-Garcia (2006) recognized both maternal psychological (daily hassles, depression, and anxiety) and biochemical (cortisol and norepinephrine) variables were related to fetal biometry measurements and estimated fetal weight. A structural equation model further revealed that when the independent variance of maternal sociodemographic, psychological distress, and biochemistry measures accounted prenatal cortisol with significant predictor of fetal weight. Women exhibiting psychological distress during pregnancy exhibit elevated cortisol levels during midgestation that are in turn related to lower fetal weight.

Wisborg, Barklin, Hedegaard and Henriksen (2008) associated psychological stress during pregnancy and stillbirth among pregnant women at Denmark. Women with a high level of stress had 80% increased risk of stillbirth (relative risk = 1.8; 95% CI 1.1-3.2). Adjustment for maternal age, parity, maternal pre-pregnancy body mass index, smoking habits, alcohol and caffeine intake during pregnancy, education and cohabitation failed to change the result. The results remained essentially unchanged after exclusion of preterm deliveries. Exclusion of women with complications during pregnancy such as diabetes, hypertension, vaginal bleeding, immunization and imminent preterm delivery failed to change the results. Likewise, restriction to women's first pregnancy in the
cohort did not change the results. Psychological stress during pregnancy was associated with an increased risk of stillbirth.

Mark Pagel, Smilkstein Regen, and Montano (1990) identified social and psychological stress factors has an influence on pregnancy outcome. Infant outcomes measures such as 1 and 5 min APGAR scores, birth weight, and gestational age were studied. The results of these analyses showed that the life events stress accounted for significant variation in both 1 minute and 5 minute APGAR scores, birth weight, gestational age at birth.

Antenatal anxiety and depression directly impact postpartum parenting stress, regardless of antenatal antidepressant treatment. Ongoing maternal mental illness in pregnancy is an important predictor of postpartum parenting stress. Early recognition and treatment to remission is key to reduce parenting stress (Misri, Kendrick, Oberlander, Norris, Tomfohr, Zhang and Grunau, 2010)

Heron o’Connor Evans Golding and Glover (2004) predicted the postnatal depression were preceded by antenatal depression; similarly, postnatal anxiety was preceded by antenatal anxiety. Despite the stability of anxiety and depression across this period, there was a mean decrease in both anxiety and depression. Antenatal anxiety predicted postnatal depression at 8 weeks and 8 months, even after controlling antenatal depression (OR=3.22, p<0.001). The findings confirm that antenatal anxiety occurs frequently, overlaps with depression and increases the likelihood of postnatal depression.

Martini, Knappe, Baum, Lieb, and Wittchen (2010) confirmed the transmission of anxiety disorders from mother to offspring. Apart from maternal anxiety, self-perceived distress during pregnancy also emerged as a putative risk
factor for adverse outcomes. Maternal anxiety disorders before birth suggests that moderator/mediator in the familial transmission of anxiety.

Buss, Davis, Muftuler, Head, and Sandman (2010) identified that pregnancy anxiety at 19 weeks gestation was associated with gray matter volume reductions in the prefrontal cortex, the premotor cortex, the medial temporal lobe, the lateral temporal cortex, the post central gyrus as well as the cerebellum extending to the middle occipital gyrus and the fusiform gyrus. Altered gray matter volume in brain regions affected by prenatal maternal anxiety may render the developing individual more vulnerable to neurodevelopmental and psychiatric disorders as well as cognitive and intellectual impairment.

Hanson, Lou, and Oslen (2000) found that women who experienced severe life events in the first trimester of pregnancy had a 50% increase in the rate of congenital anomalies in cranial-neural organs (e.g. Cleft palate). Even greater risk was associated with the most severe and rare stress, the unexpected death of the child.

Van Der Wal, Van Eijsden, and Bonsel (2007) identified the association between stress and emotional problems during pregnancy and excessive infant crying. Depressive symptoms, pregnancy related anxiety, parenting stress, and job strain during pregnancy were all univariately and multivariately associated with excessive infant crying (adjusted odds ratios between 1.69 and 2.23). Women with three or four of these antenatal risks were more likely to have an infant who cries excessively than women with no antenatal risks (adjusted odds ratio of 4.89). Stress and emotional problems during pregnancy increase the chances of having an excessively crying baby.
Roseriet Beijers, Jarno Jansen, Marianne Riksen-Walraven Carolina Weerth (2010) examined association between maternal prenatal anxiety and stress and infant illnesses and antibiotic use during the first year of life among 174 mothers with normal pregnancies and term deliveries. After controlling for many relevant confounders, prenatal anxiety and stress predicted a considerable amount of variance in infant illnesses and antibiotic use: 9.3% for respiratory, 10.7% for general, 8.9% for skin, and 7.6% for antibiotic use. Evidence showed that there is link between maternal prenatal anxiety and stress to infant illnesses and antibiotic use early in life.

Anxious pregnant women are more likely to have asthmatic children. Research confirmed that there is a strong connection between maternal anxiety at 18 weeks, and particularly at 32 weeks of pregnancy and asthma manifested in children at the age of seven and a half. (Cookson Hanna, Granell, Joinson, Ben-Shlomo, and Henderson, 2009).

Farr, Dietz, Rizzo, Vesco, Callaghan, Carol Bruce, Bulkley, Hornbrook and Berg (2013) found the associations between infant illness and infants of mothers with prenatal and postpartum depression or anxiety, or postpartum depression or anxiety. 70% of the maternal depression was diagnosed after the infant's hospitalization. 1.1 to 1.2 times infant are more likely to have (≥ 6) sick/emergency visits and increased risk of hospitalization.

Davis and Sandman (2010) predicted the consequences of prenatal maternal stress for growth and development of the child in 125 full-term infants at 3, 6, and 12 months of age. Maternal cortisol and psychological state were evaluated 5 times during pregnancy. Exposure to elevated concentrations of cortisol early in gestation was associated with a slower rate of development over
the 1st year and lower mental development scores at 12 months. Elevated levels of maternal pregnancy-specific anxiety early in pregnancy were independently associated with lower 12 month mental development scores. These data suggest that maternal cortisol and pregnancy-specific anxiety have programming influences on the developing fetus. Davis (2007) insisted that elevated maternal cortisol at 30-32 weeks of gestation was significantly associated with greater maternal report of infant negative reactivity. Prenatal maternal anxiety and depression additionally predicted infant temperament.

O'Connor, Heron, and Glover (2002) tested the hypothesis that antenatal maternal anxiety predicts behavioral problems at age 4 years. The hypothesis proved that there is a direct effect of maternal mood on foetal brain development, which affects the behavioral development of the child.

Van den Bergh, Mulder, Mennes and Glover (2005) did a literature review on antenatal maternal anxiety and stress and the neurobehavioural development of the fetus and child, the links and possible mechanisms. Review revealed that a direct link between antenatal maternal mood and fetal behaviour, as observed by ultrasound from 27 to 28 weeks of gestation onwards. 14 independent prospective studies have shown a link between antenatal maternal anxiety/stress and cognitive, behavioural, and emotional problems in the child. This link generally persisted after controlling for post-natal maternal mood and other relevant confounders in the pre and post-natal periods, the results in general support a fetal programming hypothesis. Several gestational ages have been reported to be vulnerable to the long-term effects of antenatal anxiety/stress and different mechanisms are likely to operate at different stages. Cortisol appears to cross the placenta and thus may affect the fetus and disturb ongoing developmental
processes. The development of the HPA-axis, limbic system, and the prefrontal cortex are likely to be affected by antenatal maternal stress and anxiety. The magnitude of the long-term effects of antenatal maternal anxiety/stress on the child is substantial. Programs to reduce maternal stress in pregnancy are therefore warranted.

Weinstock (2005) did a study to find the influence of maternal stress hormones on development and mental health of the offspring. Excess amounts of CRH and cortisol reaching the human fetal brain during periods of chronic maternal stress could alter personality and predispose to attention deficits and depressive illness through changes in neurotransmitter activity.

Davis and Sandman (2012) studied children exposed to elevated prenatal maternal cortisol and pregnancy-specific anxiety were at an increased risk for developing anxiety problems during the preadolescent period. Prenatal risk factors associated with lasting consequences for child mental health. The study suggested that the reducing maternal distress during the prenatal period will have long term benefits for child well-being. Anxiety during pregnancy influences the offspring's risk for delayed physical growth, motor development, impaired cognitive development, sleep disturbances, Attention Deficit Hyperactivity Disorders (ADHD), depressive symptoms (Van den Berg, 2009).

High incidences of maternal anxiety, stress and depressions provide evidence of the need for nurses to closely monitor psychosocial and biochemical profiles of all women to thwart the negative effects on developing human foetus. Parcell ma (2010)

Marcus (2003) and Flynn (2006) found that the most pregnant women do not receive screening, prevention or treatment for mood and stress concerns. They
insisted the need for the nurses to develop and implement plans for decreasing anxiety and enhancing self-confidence in all pregnant women. (Pond and Kemp, 1992)

Altshuler, Hendrick, and Cohenr (1998) found that many women may be taking psychotropic medications for these disorders when they conceive. These medications easily diffuse across the placenta, and their impact on the fetus is of concern. But discontinuation may lead to relapse, in which case psychiatric symptom may affect the fetus. Judicious treatment plan is necessary to tackle the situation.

Peddley, (1996) suggested that relaxation may be considered as a nursing therapy which has been found to decrease anxiety and enhance pain relief and that can be applied in almost any setting. Relaxation therapy has been shown to offer a variety of benefits to the physical and psychological well being of the individual. Relaxation response may be of preventive and therapeutic value when treating illnesses which are exacerbated by prolonged stress or anxiety. Relaxation techniques could be used as a tool to aid in the development of good communication pattern and trusting therapeutic relationship between the nurse and patient.

Bastani and Hidarnia (2006) investigated effects relaxation education among 110 obstetrically and medically low-risk anxious primigravidae women by a randomized controlled trial at Iran. The experimental group received routine prenatal care along with 7-week applied relaxation training sessions and the control group received only routine prenatal care. Anxiety and perceived stress were measured. Results revealed significant reductions in low birth weight, cesarean section, and/or instrumental extraction were found in the experimental
group compared with the control group. Research concluded that the beneficial effects of nurse-led relaxation education sessions during the prenatal period and serve as for improving pregnancy outcomes in women with anxiety.

Progressive muscle relaxation technique is one of the simplest forms of relaxation techniques. The investigator realized that this technique will help to improve emotional state of antenatal mothers with stress and anxiety. So helping the antenatal mother to practice this technique would help in reducing their anxiety symptom.

Keeping conducive internal and external maternal environment is necessary to help the foetus get a healthy stay inside the womb. Viewing this, the investigator developed a keen interest in reducing maternal stress and anxiety during pregnancy through the progressive muscle relaxation thereby keeping the mother and foetus/newborn emotionally and physically healthy.

1.3 STATEMENT OF THE PROBLEM

A study to assess the efficacy of progressive muscle relaxation on stress, anxiety and pregnancy outcome among primigravidae at a selected hospital in Chennai.

1.4 OBJECTIVES

The objectives of the study are to

1. evaluate the efficacy of progressive muscle relaxation on stress and anxiety among primigravidae.

2. evaluate the efficacy of progressive muscle relaxation on pregnancy outcome among primigravidae.

3. identify the relationship between stress and anxiety with pregnancy outcome among primigravidae.
4. associate the selected background variables with stress and anxiety among primigravidae.

1.5 OPERATIONAL DEFINITIONS

**Efficacy**: An art of estimating the outcome of the progressive muscle relaxation (PMR) provided to primigravidae on the level of stress, anxiety and pregnancy outcome. Stress was measured using stress scale (Calvin Hobel pregnancy specific stress, 1996), anxiety using state and trait anxiety inventory (Charlas D. Spielberger, 1983), pregnancy outcome such as gestational age at birth, mode of delivery, APGAR score and birth weight of newborn. occurrence of maternal, foetal/ newborn complications were identified from the medical record and postpartum depression was measured by Edinburgh postpartum depression scale (Cox et al. 1987).

**Progressive Muscle Relaxation (PMR)**: Systematic technique for achieving a deep state of relaxation by tensing the muscle groups for few minutes and relaxing them throughout the body.

Steps involved in PMR are preliminary and core guidelines

Preliminary guidelines- preliminary preparation

Core guidelines- Relaxation of

- Arms
- Face, neck, shoulders
- Chest
- Lower extremities and whole body
The practice of PMR was given on one- to-one basis at 21-22 weeks of gestation for two consecutive days with the help of video 20-25 minutes followed by enaction. Later self practice was done daily once for 10 weeks continuously with the help of audio cassette/CD at home. For better adherence of practice, weekly reminder was given through phone and direct reinforcement was given while attending the antenatal OPD for the check up. The performance was assessed at 2\textsuperscript{nd} (23-24 weeks GA) and 10\textsuperscript{th} (31-32 weeks GA) week with the help of checklist.

**Stress:** Response to the process of pregnancy that disturbs the normal physiological, psychological functioning and homeostasis of the women, finally cause major damage to the mood, health of the mother and fetus. Measured by stress scale based on Calvin Hobel scale for pregnancy specific stress(1996) before and after progressive muscle relaxation at 21-22 weeks and again 31-32 weeks of pregnancy.

**Anxiety:** Unpleasant emotional state consisting of two distinct forms namely state anxiety and trait anxiety.

State anxiety(S- anxiety) – it is temporary, uncomfortable experience that occurs when a woman feels threatened by the process of pregnancy. Experienced by a unpleasant subjective feeling of tension, apprehension, nervousness, worries and activation of autonomic nervous system during pregnancy as measured by Charles D. Spielberger, (1983) State and Trait Anxiety Inventory (STAI form Y-I)

Trait anxiety (T- anxiety) – considerably stable tendency of the individual, and general tendency to respond with anxiety to perceived threatened situation during pregnancy, as measured by Charles D. Spielberger, (1983) State and Trait Anxiety Inventory (STAI form Y-II)
**Pregnancy outcome**: Includes gestational age at birth, mode of delivery, APGAR score, birth weight of newborn, maternal and fetus/newborn complications during ante, intra and postpartum phase which are taken from the medical record of the women and occurrence of postpartum depression as measured by Edinburgh postnatal depression scale (Cox et al. 1987) at 6 weeks of the postpartum period.

**Primigravidae**: The first time pregnant mothers between the age of 20-34 at 21-22 weeks of gestation, booked at Sri Ramachandra Hospital (SRH) for regular ante, intranatal and postpartum care and have been identified as low risk category and having mild to moderate level of stress and anxiety as detected by Calvin Hobel scale for pregnancy specific stress and Spielberger state and trait anxiety inventory respectively.

**1.6 HYPOTHESES**

H1: There is a significant difference in the level of stress among primigravidae who practice progressive muscle relaxation than those who do not.

H2: There is a significant difference in the level of anxiety among primigravidae who practice progressive muscle relaxation than those who do not.

H3: There is a significant difference in gestational age at birth among primigravidae who practice progressive muscle relaxation than those who do not.

H4: There is a significant difference in mode of delivery among primigravidae who practice progressive muscle relaxation than those who do not.

H5: There is a significant difference in APGAR score of the newborn of primigravidae who practice progressive muscle relaxation than those who do not.
H₀: There is a significant difference in birth weight of the newborn of primigravidae who practice progressive muscle relaxation than those who do not.

H₁: There is a significant difference in the occurrence of post partum depression among primimothers who practice progressive muscle relaxation than those who do not.

1.7 ASSUMPTIONS

- Pregnancy is maturational crisis
- Individual is a biopsychosocial being in constant interaction with a changing environment
- Primigravidae experiences mood disturbance
- Stress is cumulative which endangers the health of the mother and fetus
- Individual is viewed as holistic adaptive system
- Relaxation enhances the sense of well being