CHAPTER I
INTRODUCTION
Introduction

Anthropology is the study of humanity. It has origins in the humanities, the natural sciences and the social sciences. The term "anthropology" has its roots in the Greek word *anthrōpos*, meaning "man", understood to mean mankind or humanity, and -*logia*, "discourse" or "study", and was first used in 1501 by German philosopher *Magnus Hundt*. According to Wikipedians in their book 'Social sciences, an overview', Biological anthropology, or physical anthropology, focuses on the study of human population using an evolutionary framework. Biological anthropologists have theorized about how the globe has become populated with humans, as well as tried to explain geographical human variation and race. Many biological anthropologists studying modern human populations identify their field as human ecology, itself linked to sociobiology. Cultural anthropology is also called socio-cultural anthropology or social anthropology. It is the study of culture, and is based mainly on ethnography. Ethnography can refer to both a methodology and a product of research, namely a monograph or book. Ethnography is a grounded, inductive method that heavily relies on participant-observation. Ethnology involves the systematic comparison of different cultures. The process of participant-observation can be especially helpful to understanding a culture from an emic point of view, which would otherwise be unattainable by simply reading from a book (Vermeulen, 2006).

Medical anthropology is an interdisciplinary field which studies human health and disease, health care systems, and bio-cultural adaptation (McElroy, 1996). It views human from multidimensional and ecological perspectives (McElroy and Patricia, 1989). It is one of the most highly developed areas of anthropology and applied anthropology (Smith,1990) and is a subfield of social and cultural anthropology that examines the ways in which culture and society are organized around or influenced by issues of health, health care and related issues. The term "medical anthropology" has been used since 1963 as a label for empirical research and theoretical production by anthropologists into the social processes and cultural representations of health, illness and the nursing/care practices associated with these (Norman, 1963). Bio-cultural anthropology is a part of medical anthropology. It attempts to understand how culture affects our biological capacities and limitations. Culture has grown to become a prominent aspect of our environment over the past few thousands of years, and it
continues to grow at an accelerating rate. Bio-cultural anthropology explores how this increasingly complex and diversified cultural environment challenges human biology.

**Polycystic ovarian syndrome (PCOS)**

Polycystic ovarian syndrome (PCOS) is one of the most common endocrinial disorders among women, affecting 5-10% of women at their reproductive age (Franks, 1995). The syndrome was first defined in 1935 by Stein and Leventhal based on the observation of a set of symptoms such as amenorrhea, hirsutism and obesity in women whose ovaries were enlarged and contained multiple follicular cysts. It is a disorder in which women do not experience normal release of eggs from the ovaries (ovulation). They have an abnormal production of male hormones and their body is resistant to the effects of the hormone insulin. PCOS is a heterogeneous collection of signs, and symptoms that, when gathered together, form a spectrum of a disorder with a mild presentation in some, and a severe disturbance of reproductive life, endocrine and metabolic function in others. Key features include menstrual cycle disturbance, hyperandrogenism (hirsutism, acne and elevated serum testosterone concentration), and obesity. The disorder also is an impaired glucose tolerance and type-II diabetes and includes various characteristics of metabolic syndrome such as obesity and insulin resistance (IR), thus being strongly related to a higher risk of developing cardiovascular disease. About 50% of women with PCOS are overweight. Bernasconi (1996), Jayagopal et al., (2002) suggest that insulin resistance is a cardinal feature of overweight patients of PCOS. Hyperandrogenism is associated with a preferred fat accumulation at the upper body. This so-called android fat pattern, which has been described in obese as well as in lean women with PCOS (Kirchengast and Huber, 2001; Bringer, 1993; Douchi, 1995), may indicate diminishing fertility (Kirchengast and Huber, 2001; Pasquali and Casimirri, 1993). Also, women with android fat pattern are at risk for developing cardiovascular diseases, diabetes mellitus, and endometrial cancer (Rebuffe-Scrive et al., 1989; Rouzi and
Ardawi, 2001; Acien et al, 1999). Women with Polycystic ovarian syndrome are at an increased risk for the cluster of conditions, which also includes high levels of triglycerides and low levels of high density lipoprotein (good cholesterol). Cholesterol is a type of fat that is both made by the body, and ingested through our diet. There are a number of types of cholesterol that is measured through routine screening. High density lipoprotein, or HDL, is considered to be the “good” cholesterol. In sufficient amounts, it keeps bad cholesterol from building up in the blood vessels. Low density lipoprotein, or LDL, is known as the bad cholesterol. It is produced by the liver and carried in the blood throughout the body. In high quantities, it can accumulate on the wall of the blood vessels and create blockages (Nicole, 2009).

**Symptoms**

According to Natural health solutions for PCOS, Polycystic ovarian syndrome presents a complex and baffling array of symptoms. The condition is associated with some combination of the following symptoms that vary widely with each individual:

**a. Multiple ovarian cysts**

The elevation in insulin levels contributes to the formation of cysts in the ovaries in part due to the hormonal imbalances and also because the ovaries are highly sensitive to the influence of insulin. Polycystic ovaries are defined as 12 or more follicles in at least one ovary as seen by ultrasound. Follicles are small, fluid-filled sacs containing eggs. In PCOS, the follicles bunch together to form cysts. Note that not every woman with PCOS has polycystic ovaries. Affect: The multiple, immature ovarian cysts, after which the condition was named, is associated with irregular menstruation and trouble conceiving.

**b. Irregular or absent menstrual cycle (Amenorrhea or Oligomenorrhea)**

Menstrual disturbance, particularly oligo and amenorrhea, is one of the cardinal signs and symptoms of polycystic ovary syndrome. This symptom, associates with polycystic ovaries and/or signs of hyperandrogenism usually infers absent or irregular ovulation which is mostly implicated as the source of infertility (Adam et al., 2005). Nine or few menstrual cycles per year may be a sign of PCOS. Bleeding may be heavier than normal. These conditions are caused because the ovaries are not producing hormones that keep the menstrual cycle regular. Affect: Irregular or absent
menses indicate that a woman is probably not ovulating indicating difficulties in getting pregnant.

c. Infertility

Polycystic ovarian syndrome and infertility can go hand in hand. PCOS is a major cause of infertility. A symptom of the condition can be nine or fewer menstrual cycles per year. The disorder may also cause heavier than normal bleeding during periods. These conditions are the result of the ovaries failing to produce hormones that keep the menstrual cycle regular. Because women with PCOS do not have regular periods, many are unable to ovulate and become pregnant. Today, infertility affects at least 12% of couple worldwide (Fishel et al., 2000). For the affected couples, infertility has profound social and personal implications resulting in a decreased sense of well-being. According to the results of several medical anthropological studies carried out during the last decade (Feldman-Savelsberg, 1994; Inhorn, 1994, 2003; Inhorn and Buss, 1994; Ericksen and Brunette, 1996; Nahar et al., 2000; Fido, 2004). While it is possible to become pregnant, women with PCOS tend to suffer a much higher rate of miscarriages. Estimates put the rate of miscarriages in women with PCOS at 45% although some believe the figure may be higher. Fertility problems experienced by women with PCOS may be related to the elevated hormone, insulin, or glucose levels, all of which can interfere with implantation as well as development of the embryo. Additionally, abnormal insulin levels may also contribute to poor egg quality, making conception more difficult. Stabilizing hormone levels can help fertility by promoting ovulation.

Infertility is of two types, namely, (a) primary infertility, which denotes those patients who have never conceived and, (b) secondary infertility which indicates previous pregnancy but failure to conceive subsequently (Dutta, 2003). Affect: Infertility, or difficulty in getting pregnant, can dramatically affect a couple’s relationship. Opening up of their private sexual life to strangers and medical professionals may also hamper intimacy of the couples. Many women also report about feeling guilty for their infertility and determine themselves as at fault for the failed cycles and loss of money and time in the process. This is one reason why couples going through infertility treatment fight about money, intimacy and many other things.
d. Acne

Pimples and oily skin can also bother women with polycystic ovary syndrome. The acne is usually found around the face (especially along the jaw line), chest and back. Affect: Besides causing reproductive changes like irregular periods and difficulty in conceiving, PCOS can cause a number of distressing symptoms. Acne, irregular hair growth, hair loss, skin tags and weight gain are all potentially caused by PCOS. Many women report having low self esteem as a result of those symptoms. They may get sick of having to deal with the chore of hair removal or acne treatment. Even worse, most people have never heard of PCOS and don’t understand why they are having trouble with their weight or excess hair on their face.

e. Weight gain or inability to lose weight

Many women with PCOS gain weight around their abdomen, making it in the form of an apple shape rather than a pear shape. Such weight gain is linked with imbalances of glucose and insulin in the body. Other women may not necessarily gain weight but find that, no matter how hard they try, they cannot lose any weight. Not every woman with PCOS will have problems with excess weight. In fact, study shows that around half the women with PCOS are lean. Such lean women with PCOS may also struggle either with their high insulin levels or insulin resistance. Affect: Because of the difficulties that many women with PCOS have in losing weight, they may become envious of friends who can eat whatever they like without gaining any weight. Many women also report about developing a habit of constantly comparing themselves with their skinnier friends or are embarrassed about their excess weight. They blame themselves for their extra weight instead of recognizing the medical condition that is making it so hard for them to lose weight.

f. Excess hair growth (Hirsutism)

This symptom causes excess facial hairs, which could cause a big problem for many women. For most PCOS sufferers, hairs in the mustache and beard areas become heavier and darker. Masculine-looking hair on the arms and leg is also possible, as well as hair on abdomen, chest or back, together with growing more in the pubic area. Growth in the levels of male hormones in the body causes this condition.
g. Thinning of scalp hair
Just as the heavier hair growth is possible, so is also the thinning of hair that many women experience like that of men. This is caused in women by higher levels of androgens.

h. Velvety, Hyper-pigmented skin folds (Acanthosis nigricans)
Thick lumps of skin sometimes as large as raisins - can form as a result of PCOS. They are usually found in the armpits, at the bra line or neck and can easily be removed by a dermatologist. Darkening and thickening of the skin can also occur around the neck, groin, underarms or skin folds. This condition, called Acanthosis nigricans, is a sign of Insulin resistance, the underlying cause of PCOS. Other women with PCOS note an increase in dandruff.

i. High cholesterol (Hyperlipidemia) and high blood pressure (Hypertension)
Increased Low density lipoprotein, the "bad" cholesterol, is known as a marker for risk of heart attack and stroke. Women with polycystic ovary syndrome must pay special attention to their cholesterol levels and also their blood pressure, as both of these markers of heart disease are more prevalent in this community.

j. Polycystic ovaries are 2-5 times larger than healthy ovaries.

k. Sleep apnea
Women with PCOS have a high risk for sleep apnea. This may be due to the increased body mass index in about half of women with PCOS. Another possible reason for the increased prevalence of sleep apnea in people with PCOS is the effects of testosterone on blood vessels.

l. Mood disorders, including anxiety and depression
Many women with PCOS may find themselves more anxious or depressed by their appearance or their inability to become pregnant. Mood swings can also be caused by hormone problems. Managing your PCOS symptoms may help to relieve depression.

m. Appetite disorder

n. Multiple hormone imbalances, commonly including: Androgens (testosterone), Estrogens, Follicle stimulating hormone (FSH), Insulin, Luteinizing hormone (LH), Progesterone, Prolactin (PRL), and Thyroid hormones (TSH).

**Importance of the present study:**
Polycystic ovarian syndrome (PCOS) is a growing problem in countries like India and China, especially in big cities. It is a growing concern of today and every woman should
be aware of this. Polycystic Ovarian Syndrome is one of the most common endocrine disorders. This syndrome is rising in number now-a-days in most of the women. It is difficult to assess the actual scientific cause of this disease. But most of the research concluded that biological as well as cultural aspects may be the most prevalent causes. So the aim of the present study was to analyze the impact of cultural aspects on perception of PCOS symptoms and, above all, infertility of the three populations of Guwahati city. And also to find out how far bio-cultural factors effect on this disease.

**Bio-cultural factors responsible for causing polycystic ovarian syndrome**

Leatherman and Goodman (2005) states that “human health and well being is cultural” and the notion that human health and illness are interwoven bio-cultural process. This bio-cultural perspective on health and illness is essential to the understanding of the following aspects that specializes in: cultural and biological influences on health and mental health; treatment choice and healing; reproductive health and so on.

**a. Biological**

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder affecting female fertility (Homburg, 1996; Kousta et al., 1999; Balen and Michelmore, 2002), originally described as early as 1935 (Stein and Leventhal, 1935) and since then the subject of extensive analyses, although its etiology and pathophysiology are poorly understood even now (Franks, 1989, 1995; Balen, 1999). Exactly why and how PCOS develops is not quite clear, however most experts now agree that insulin plays a major role. Current studies clearly link Polycystic ovarian syndrome and insulin resistance. Due to PCOS, high levels of insulin stimulate the ovaries to produce large amounts of testosterone (a male hormone), which can possibly prevent the ovaries from releasing an egg each month, thus causing infertility. High testosterone levels can also cause excessive hair growth, male pattern baldness and acne.

According to ‘Insulite health PCOS’, “because insulin production of the pancreas is thrown off by the insulin resistance, the conversion of food to energy is impaired and there is an increase in the amount of stored fats. When glucose cannot enter the cells efficiently, it remains in the blood stream, causing elevated blood sugar which is sent to the liver, where it converts to fat and is stored throughout the body”. According to Martha McKittrick (2011), many women with PCOS have insulin
resistance, this means that the process of getting the sugar out of the blood and into the cells is defective - the cells are “resistant” to insulin. The pancreas must secrete more and more insulin to get sugar out of the blood, causing any or all of the following conditions: polycystic ovaries, weight gain and / or difficulty losing weight, heart disease. In addition, it can increase risk of diabetes by up to 40% by age 40.

Insulin resistance prevents the efficient conversion of food into energy because the walls of the cells have become de-sensitized to insulin. This causes glucose and insulin levels in the blood stream to become severely unbalanced, leading to an increase in free-floating glucose, which is sent to the liver and converted to excess body fat. As a result, there can be weight gain and obesity. Obesity is the generalized accumulation of excess fat in the body. It is a condition in which there is excessive weight gain due to increased intake of fat and carbohydrate. When more energy is taken through food and less is utilized through activities the excess is converted into fat and stored which results in obesity. It is estimated overall 20-60 percent of patients with PCOS will be defined as obese; the incidence varies depending on the criteria used to define over - weightness. Obesity in PCOS worsens the degree of insulin resistance and hyperandrogenemia, and weight loss can improve the endocrine and ovulatory function.

And, according to Health and nursing issues Australia, the intricate process of a woman’s reproductive cycle is regulated by fluctuating levels of hormones produced by the pituitary gland in brain, including luteinizing hormone (LH) and follicle stimulating hormone (FSH), and by ovaries. The ovaries secrete the female hormones - Estrogen and Progesterone and also produce some androgens, the so-called male hormone. Androgen includes testosterone, Androstenedione and Dehydroepiandrosterone (DHEA). In polycystic ovary syndrome, body produces an excess of androgens, and the ratio of LH to FSH is often abnormally high. The process of ovaries releasing eggs (ovulation) occurs less frequently than normal (oligo-ovulation), or the ovaries do not release eggs at all (anovulation). In the absence of ovulation, the menstrual cycle is irregular or absent. The exact cause of polycystic ovary syndrome is still not clear, but research suggests a link to excess insulin, the hormone produced in the pancreas that allows cells to use sugar (glucose), body’s primary energy supply. By several mechanisms, excess insulin is thought to boost androgen production by ovaries. When the ovaries do not produce the hormones needed for ovulation and proper function of
the menstrual cycle, the ovaries become enlarged and develop many small cysts which produce androgens.

Genetic inheritance probably influences 50-70 per cent a person’s chance of becoming fat more than any other factor. A genetic base regulates species differences in body fat and sexual differences within a species. Within families the chances is 80 per cent if both parents are obese and 50 per cent if one parent is obese (Ramadas et. al., 2011). In 1918, Fisher pointed out that variation of continuous or quantitative traits could be explained by the combined action of a set of individual genes. Common disease such as polycystic ovary syndrome and Type-2 Diabetes are also likely to be a combination of common genetic variants (Bougneres, 2002). In humans, type-2 diabetes and insulin resistance have a genetic component, and the search for candidate genes has included those involved in obesity, insulin signaling pathways, mitochondrial genes and steroidogenesis (Prentice, 2005). Women with polycystic ovary syndrome have a three-to-five increase in risk of having a family history of Type-2 Diabetes (T2D); and conversely 80% of women with T2D, in one report, have evidence of polycystic ovaries (Conn et al., 2000).

b. Cultural
The social and personal lifestyle implications are strongly associated with the cultural and/or religious background of the affected women. Particular psychological problems may result from fertility disorders such as polycystic ovarian syndrome which show a wide range of possible symptoms, all of them affecting female identity (Eggers and Kirchengast, 2001).

Life style
Life style has a positive impact polycystic ovarian syndrome. Women of the urban areas are educated so as their lifestyle became luxurious, of less physical activities and eat foods which are of caloric value and almost their husbands bear higher occupational status. Women of urban areas prefer sedentary lifestyle. A sedentary lifestyle plays a significant role in obesity (Seidell et. al., 2005). Worldwide there has been a large shift towards less physically demanding work, (WHO, 2008; WHO, 2009; and Ness-Abramof et. al., 2006) and currently at least 30% of the world's population gets insufficient exercise (WHO, 2009). This is primarily due to increasing use of mechanized
transportation and a greater prevalence of labor-saving technology in the home (WHO, 2008; WHO, 2009; and Ness-Abramof et al., 2006). In children, there appear to be declines in levels of physical activity due to less walking and physical education (Salmon et al., 2007). Thus, obesity is one of the factor of PCOS seems to be greatly affected by one’s lifestyle. Due to PCOS married women are mainly shows the symptom of irregular menstruation and infertility. So, their quality of life is negatively affected and suffers from depression.

The Constitution of the World Health Organization (WHO) defines health as ‘a state of complete physical, mental, and social well-being not merely the absence of disease’. It follows that the measurement of health and the effects of health care must include not only an indication of changes in the frequency and severity of diseases but also an estimation of well being and this can be assessed by measuring the improvement in the quality of life related to health care. Although there are generally satisfactory ways of measuring the frequency and severity of diseases this is not the case in so far as the measurement of well being and quality of life are concerned. WHO defines Quality-of-life as individual perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment. Many of the symptoms of polycystic ovarian syndrome may be associated with psychological disturbances, and any symptom may worsen a pre-existing tendency to psychological dysfunction. Hirsutism has been shown to cause marked psychological stress (Sonino et al., 1993), and infertility issues can cause tensions within the family, altered self-perception, and problems at work (Paulson et al., 1988; and Downey et al., 1989). It is easy to see how PCOS may impact upon a woman’s quality of life and psychological wellbeing, yet this area has yet to be fully researched. Most of the literature on PCOS concerns clinical objectives, such as rates of pregnancy with ovulation induction, or changes in acne and hirsutism scores. There is little written on women’s assessment of their own state of well-being, for example, as assessed by ‘health-
related quality of life' (HRQoL), which is multi-dimensional concept encompassing physical, psychological and social aspects of a disease process (Naughton et al., 1997).

Depression is a complex disorder, in which several factors may contribute to the disease. Depression in women with polycystic ovarian syndrome may be simply caused by the psychological stress of having this disorder (Nicole Galan, 2012). Symptoms may include, but are not limited to:

- Difficulty sleeping
- Change in eating
- Sleeping more than usual
- Loss of interest in hobbies or activities previously enjoyed
- Persistently feeling down or sad
- Weight changes – gain or loss
- Feeling of guilt, hopelessness or worthlessness
- Difficulty concentrating or focusing
- Inability or difficulty in making decisions
- Physical pains such as neck/backache, headache, digestive issues

Age group

Age affects the PCOS women both by physically and mentally. As the age of a woman rises, the fat deposition in the body, hormonal concentration, psychological condition changes. According to Zaadstra et al., (1993), concluded those women suffering from PCOS are more prone to android fat distribution. As age of a woman increases, the reproductive age decreases due to several factors.

Occupation

Women of urban areas afford less physical stress rather than women residing in rural areas. Thus, urban women suffer from various diseases cause due to the accumulation of fats such as diabetes, heart disease, obesity, PCOS (Balen et al., 2006). Women those who are housewives spent their leisure time on watching television along with nibbling snacks, sleeping, gossiping, etc. And on the other hand, working women more rely on processed foods or those foods
which are cooked in less efforts, eat fast foods, and mostly they prefer sitting jobs. Thus, there are many reasons to accumulate fats.

**Education**

Education is not directly related with PCOS. As women are not aware of this disease, they go easy with their lifestyle. They eat fatty foods, sleep, and do less physical activities and get affected by obesity. Obesity is found in persons who lead sedentary lives and pay less importance to physical education. Though obesity can occur at any age, this is more common during middle age when physical activity decreases without corresponding decrease in food consumption. Thus, as they do not have the knowledge about the factor of the disease, they unknowingly get affected with PCOS.

**Food habit**

Food is very important factor of PCOS. A well balanced diet is very important in general day to day life as well as to prevent PCOS or if one get affected by PCOS due to overweight than it is very important to reduce weight. Studies conducted at Nutrition Foundation of India have shown more females than males are found to be overweight in all age groups.

According to Srilakshmi (2007), certain type of eating habits may lead to obesity:

- Nibbling between meals is common among housewives and is a potential cause of obesity.
- Some may eat faster taking less time for chewing, therefore they tend to consume more food.
- Housewives who are fond of cooking variety of foods or persons who are working in the kitchens may become obese.
- Housewives who do not want leftover foods to be thrown out may consume forcibly and put on weight.
- People who eat outside home more frequently are prone to obesity.
- Non-inclusion of fruits and vegetables and non-vegetarian diet favour weight gain.
- People who like eat processed, concentrated and high fat foods are susceptible to obesity.
- Certain cultural practices like making and distributing sweets on festive occasions contribute to increased caloric consumption.
- There is an abundance of palatable, calorifically dense food available in the market. Aggressive and sophisticated marketing in the mass media, super markets and restaurants and large portions of food served outside the home promote high calorie consumption.
- People who eat more junk food may become obese.

According to Ulijaszek and Lofránk (2006) "obesity is the condition in which excess body fat has accumulated to the degree that health and function are negatively affected". A person’s weight can have a profound impact on fertility (Bolumar et al., 2000). Excess weight is not only linked to increased risk of chronic diseases (Must et al., 1999), but has also been shown to increase the risk of reproductive problems (Catalano, 2007). Several studies have shown that women with excess body weight are more likely to have fertility problems (Jensen et al., 1999; Rich-Edwards et al., 2002; Pasquali, 2006; Gesink and Maclehose, Longnecker, 2007). There is strong evidence indicating the familiar aggregation in polycystic ovary syndrome, suggesting that genetic factors play an important role in the development of this syndrome. Studies of families with polycystic ovary syndrome cases have evidences of heritability of hyperandrogenaemia and hyperinsulinanemia, and first-degree relatives of women with polycystic ovarian syndrome present increases incidence of features such as oligomenorrhea, polycystic ovaries and androgen excess, beyond the metabolic alteration such insulin resistance type-II diabetes and lipid abnormalities. Therefore, familial history, indicating the genetic risk, must be considered as an important risk factor for the development of PCOS. However, the heterogeneity of phenotypic features in different and within the same families underscores the importance of the environmental contribution in the manifestation of this syndrome, especially of obesity.
The prevalence of obesity is high in all studies of women with PCOS and obese women with PCOS have higher rates of hirsutism and greater irregularities of the menstrual cycle (Balan et. al., 2002). About 38-88% of women with PCOS are estimated to be overweight or obese (Alvarez-blasco et. al., 2006), with the history of weight gain usually preceding the onset of oligomenorrhea and hyperandrogenism, suggesting a pathogenic role of obesity in the development of the syndrome (Pasquali R, 2006).

There importance of the relationship between obesity and polycystic ovarian syndrome (PCOS) is reflected on the recommendations for the treatment of this syndrome, whose main objective is the reduction of weight and of abdominal fat in order to normalize serum androgen levels, to reduce insulin resistance and to restore reproductive function. Short-term weight loss has been successful in reducing insulin resistance and restoring ovulation and fertility (ESHRE, 2008; Barber et. al., 2006; Norman et. al., 2002; and Stames et. al., 2004), resulting in strong recommendation of care with weight among women with PCOS (Moran et. al., 2004). And, a modification of life style is the first form of treatment of PCOS, involving weight loss and the regular practice of physical activity. Weight loss should be achieved by adopting healthier dietary habits and nutritionally complete and balanced diets (Rich - Edwards et. al., 2002).

A common misconception is that everyone with polycystic ovarian syndrome (PCOS) is overweight, but this is not always the case. In fact, at least half of women diagnosed with this condition are of normal weight; some are even underweight. Studies have shown that insulin resistance can be present in both lean and obese women with PCOS, indicating to researchers that there may be other factors affecting the imbalance in the insulin/glucose mechanism. And although doctors may not want to use the term “insulin resistance” because of the absence of obesity, nonetheless, thin women with polycystic ovarian. It is very clear to experts that Polycystic ovarian syndrome symptoms in lean women present the same increased health risks. It appears then, that women with “lean PCOS” have much in common with their heavier counterparts. They both exhibit, in varying degrees, the symptoms of elevated testosterone, and insulin
resistance and excess insulin levels in the blood as pointed out by a 2004 article, "Insulin sensitivity in women with polycystic ovary syndrome," published in *The Journal of Clinical Endocrinology and Metabolism*. Frisch (2000) proposed that a minimum percentage of body fat was necessary to initiate menarche and sustain menstruation. A more consensus concludes that the availability of oxidisable metabolic fuel, rather than a minimum amount of fat, is critical factor to maintaining ovarian function (Wade and Jones, 2004). Frisch (1988) suggested that underweight women would also have impaired reproductive function owing to a lack of estrogen produced in adipose tissue. Insulin, leptin (produced by adipose tissue), and blood glucose are important mediators of the relationship between energy balance and ovarian function (ESHRE Capri Workshop Group, 2006). Insulin is essential for fertility, stimulating production of luteinizing hormone and increasing ovarian production of steroid hormones (Poretsky et al., 1999).

**Detection of polycystic ovarian syndrome**

Rather from the earlier mentioned signs and symptoms of polycystic ovarian syndrome (PCOS); the ultimate decision that a woman is suffering from PCOS can be detected by using the method - "Ultrasonography". Ultrasound imaging, also called Ultrasonic Scanning or sonography is a method of obtaining images from inside the human body through the use of high frequency sound waves. The reflected sound wave echoes are recorded and displayed as a real-time visual image. Dussik, a psychiatrist from Austria was the first one to successfully implement a medical use of diagnostic ultrasound as early as 1942. It is very encouraging aspect of present scenario of gynecological and obstetrical practices through which lives of hundreds very critically ill gynecological patients as well fetuses could be saved. They routinely use the sonography for fetal maturity in very early pregnancy, and also for detection of cyst in uterus.

More than 40% of radiologists are already using ultrasound scanner with Colour-Doppler facility and remaining are very fast upgrading their centres from Black and White ultrasound scanner to Colour-Doppler Scanner. There are different types of scanner with different. Probe or transducers configuration that are currently being used
in India. One of them is Endocavity Probe, which is used for follicular study and early pregnancy investigations in females (Dutta, 2003).

**Adverse effects of polycystic ovarian syndrome**

The name polycystic ovarian syndrome (PCOS) comes from the appearance of the ovaries in some women with the disorder-large and studded with numerous cysts. The disorder results in infertile abnormal masculinization and bears the risk of diabetes, heart disease and certain types of cancer. An association between PCOS and type-I endometrial cancer has often been reported in the literature. The prolonged anovulation with consequent continued section of estrogen unopposed by progesterone may enhance the development and growth of this malignancy, particularly in young women. Hyper secretion of luteinizing hormone (LH), chronic hyper insulinemia and increased serum insulin like growth factor (IGF-I) levels may represent risk factors for endometrial cancer. A possibility of an association between PCOS and epithelial ovarian cancer risk, and the results are conflicting but generally reassuring and similarly the few available data appear to exclude a strong association between PCOS and breast cancer (Gadducci et al., 2005).
Objectives of the present study

The objectives of the present study are as follows:

a. Attempt to substantiate the common symptoms of polycystic ovarian syndrome.
b. To examine the demographic profile of the three experimental and controlled groups and test the statistical significance.
c. To examine the biological profile and factors of the three experimental and controlled groups and test the statistical significance.
d. To examine the reproductive performance of the three experimental and controlled groups.
e. To examine the anthropometric measurements of experimental and controlled groups.
f. To compare the socio-demographic profiles of the three experimental and controlled groups.
g. To compare the reproductive performance of the three experimental and controlled groups.
h. To compare the biological and social factors of experimental and controlled group.
i. To examine the relationship between the socio-cultural variables with the reproductive performance of the three experimental groups.
j. Study the level of depression and how it is related to the symptoms of experimental group.
Materials and methods

Subjects

This study is basically focused on women who suffered from PCOS and sought medical assistance for infertility at Pratiksha Hospital, Guwahati. The sample consists of cases of Assamese, Bengali and Rajasthani women who visited the IVF unit of ‘Pratiksha’, a hospital of Guwahati, Assam for treatment of infertility. The fieldwork was carried out during the period from February 2008 to May 2010. Three samples of women having PCOS were drawn -one for each cultural group viz Assamese, Bengali and Rajasthani. A total of 456 women between 18 and 45 years of age have been included in the samples. They are referred to here as ‘Experimental group’. Another sample of 501 women of the same three cultural groups who are visitors to the hospital for various reasons having no serious illness, between 18-45 years of age who are not suffering from PCOS have also been drawn and are referred to here as ‘Controlled group’.

Table –I.1: Sample size of the three cultural groups

<table>
<thead>
<tr>
<th>Populations</th>
<th>Sample size of experimental group</th>
<th>Sample size of controlled group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assamese</td>
<td>172</td>
<td>228</td>
</tr>
<tr>
<td>Bengali</td>
<td>167</td>
<td>141</td>
</tr>
<tr>
<td>Rajasthani</td>
<td>117</td>
<td>132</td>
</tr>
<tr>
<td>Total</td>
<td>456</td>
<td>501</td>
</tr>
</tbody>
</table>

The sample of Assamese experimental group is of size 172 and Assamese controlled group is of size 228. Similarly, Bengali experimental group consists of 167 women and that of controlled group consist of 141 women. Lastly, Rajasthani experimental group is of size 117 and that of controlled group is with 132 women.

The presence of polycystic ovaries was determined using the following criteria: the sonographic ultrasound (transvaginal) picture shows ≥ 10 cysts from 2mm to 10mm in diameter distributed evenly around the ovarian periphery with an increased amount of stoma (Adams et. al., 1985). Before starting the actual fieldwork, a schedule was
prepared, and filled up through interviewing and direct-observation method and which were canvassed during the final phase of the fieldwork.

**Data:** For the purpose of collection of information on demography, two schedules were specially designed. The first schedule was household schedule, designed to record the demographic composition of the families. Including name, community, religion, present age, nature of occupation (experimental and controlled group and their husbands), food habit, education (experimental and controlled group and their husbands), economic condition, active married life. The second schedule designed to record the reproductive performance of both experimental and controlled groups.

The monthly income of the three experimental and controlled groups classified into three groups, ranges from <15,000; 15,000-25,000; and >25,000. The occupational status is divided into housewives; Govt. service; private job; and business. And, the educational status is classified into three groups, such as, individual studied upto Class-X; Graduate and Post-graduate.

While taking the anthropometric measurements I have considered, height, weight, abdominal skinfold, suprailliac skinfold, body mass index and waist-hip ratio. After collecting height (in meter) and weight (in kg), the body mass indexes were calculated of both experimental and controlled groups, and classified as follows:

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight category</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.6-24.9</td>
<td>Normal weight</td>
</tr>
<tr>
<td>25-29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>≥ 30.0</td>
<td>Obese</td>
</tr>
</tbody>
</table>


And, after collecting the waist and hip circumference (in cm), the waist-hip ratio of experimental and controlled wives are calculated and classified as (Lefebvre et. al., 1997):
WHR $\geq 0.8$ (Android or male fat distribution)

WHR $< 0.8$ (Gynoid or female body fat distribution)

The reproductive performances of the experimental and controlled group are collected through proper schedule. The fertility schedule was completed by filling in the information on the number of live births, number of reproductive wastage (abortion and still births), sex, present age, age at death, birth order and so on.

In order to analyze the individual Health-related-quality-of-life in the affected women, Cronin's health-related-quality-of-life-questionnaire was used (Cronin et al., 1998). This questionnaire was developed to measure the individual Quality of Life in affected women. Five factor groups were defined emotions (psychological problems, depression); hirsutism; body weight (overweight fat patterning); menstrual problems (amenorrhoea, oligomenorrhea); and infertility. Out of 26 questions, only 18 questions are selected for my research study (excluded sexual queries).

The ABO blood groups of both the experimental and controlled groups of all the three populations have been taken into consideration.

The hormonal concentrations of the patient were collected from the history sheet of the patient concerned.

While measuring the level of depression of the affected women 'Beck's Depression Inventory' questionnaire was used. There are all total 21 questions. But I have selected only 16 questions for my study (excluding sexual queries and questions not related to my study). And the level of depression can be divided according to their scores, i.e, range of the score is between 0 and 48. People who score between 0-10 is considered as normal; 11-21 as the presence of moderate level of depression and; 22 and above as severe level of depression.

**Cultural groups and study area**

**a. Cultural groups**

**Assamese people**

The population of Assam is a broad intermixture of Mongoloid, Indo-Burmese, Indo-Iranian and Aryan origin (Hunter, 1991). This broad group of people, the native of
the state of Assam, and their language is called "Asomiya" or "Assamese". Assam is a multilingual state. According to the 1991 census, the population of Assam is 22 million, 89 percent of which is rural. Assamese-speaking Hindus represent two-thirds of the state's population. The word "Assamese" is also used to refer to those ethnic groups and communities who have been living in the state of Assam. A majority of the Assamese are Vaishnavas (a sect of Hinduism). The Vaishnavas do not believe in idol worshiping and perform Namkirtana where the glory of Lord Vishnu is recited. The Shakta’s on the other hand follow traditional Brahminical Hinduism. Followers of other world religions such as Buddhism, Christianity, Islam are also found in Assam. Tribal religions are mainly practiced by the different tribal communities that have been living in the region from time immemorial. The national festival of Assam is the Bihu which is celebrated in three different seasons a year with great pomp and grandeur by all Assamese, irrespective of caste, creed or religion. About a quarter of the population is Muslim. Most Muslims are recent settlers from Bangladesh, although there have been some Muslims in Assam for several centuries. The older Muslims are well-integrated with the society (Embree, 1988).

Rajasthani people

Rajasthani is a word derived from the name of a state of independent India, Rajasthan. Any resident of Rajasthan is called Rajasthani (from a regional point of view); whereas Marwari is a word derived from the name of the Marwar region (which after independence became a part of Rajasthan state). So, residents of the Marwar region are basically Marwaris. Hence, all Marwaris are Rajasthanis but not all Rajasthanis are Marwaris. Though Marwari as a genre originated from a place name, in more recent times the term Marwari is often used for the trading class from the Marwar region. Rajasthani are actually the people from Rajasthan in India. Although Marwar refers to the region around Jodhpur, most marwari merchants are actually from Shekhawati. Though Marwari as a genre originated from a place name, the Marwari people have spread too many regions of India, and even to neighboring countries, as they expanded their business and trade networks. The word Marwar is considered to be derived from Sanskrit word Maruwat, the meaning of maru being 'desert'. Shekhawati region is adjacent to Haryana, the original home of the Agrawals who form the bulk of Marwari banias. Marwar is the largest region of
Rajasthan, located in the central and western areas of the state. The residents of Marwar region have been called Marwaris, irrespective of their caste. The term 'Marwari' has a geographical connotation, so there can be a Marwari baniya, a Marwari Rajput, a Marwari Brahmin, and so on.

Marwari is a language belonging to the Sanskritic subgroup, of the Indo-Aryan branch, of the Indo-European language family. Marwari, or Marrubhasha, as it is referred to by Marwaris, is the traditional, historical, language of the Marwari ethnicity. The earliest recorded account begins from the time of Mughal Empire. Since the time of the Mughal period (16th century-19th centuries), particularly from the time of Akbar (1542-1605), Marwari entrepreneurs have been moving out of their homeland of Marwar and Rajasthan, and adjoining regions, to different parts of undivided India. The first waves of migration took place during the Mughal period, and a number of Marwari baniyas moved to the eastern parts of India, currently comprising the Indian states of West Bengal, Bihar, Orissa, and Jharkhand; as well as the nation of Bangladesh (Hardgrove, 2004).

In Assam there are a sizeable number of Rajasthani people. There are records that show that they have migrated to Assam since 18th century or even earlier. A handful of the early Rajasthani families that came to Assam for business purpose have not only become integrated in to the Assamese community completely, but also have made great contribution to the art, culture and literature of Assam. At present, the Rajathani people are found in all the districts of Assam. Guwahati, being the commercial hub of Assam and the entire north eastern region, has a large number of Rajathani families who have been residing in the city from several generations past.

**Bengali people**

The Bengali people are an ethnic community native to the historic region of Bengal (now divided between Bangladesh and India) in South Asia. They speak Bengali (Bangla), which is an Indo-Aryan language of the eastern Indian subcontinent, evolved from the Magadhi Prakrit and Sanskrit languages. In their native language, they are referred to as Bangali. They are mostly Indo-Aryan people from the eastern Indian subcontinent. However, many are also descended from Austro-Asiatic and Dravidian peoples, and closely related to the Assamese and other East Indians, as well as to Munda and Tibeto-Burman peoples. As such, Bengalis' are
a homogeneous but considerably diverse ethnic group with heterogeneous origins (Islam, 2003). Two major religions practiced in Bengal are Islam and Hinduism. In Bangladesh 88.3% of the population follow Islam (US State Department est. 2007) while 9.2% follow Hinduism. In West Bengal and Assam, Hindus are the majority with 70% of the population while Muslims comprise 23%.

The state of Assam is adjacent to the Bengali speaking areas just mentioned. There has been a continuous movement of people between eastern Assam (mainly Goalpara and Kamrup) and Bengal since ancient times (Barpujari H.K : 1987: 34). After the Treaty of Yandaboo in 1826, there has been a tremendous migration of Bengali speaking people into Assam (ibid: 35-6) who had settled down in Assam. It may be mentioned here that, numerically Bengali speaking people are dominant in the Barak valley districts of Assam.

Like the Rajasthanis, the Bengali people are also distributed in different districts of Assam including Guwahati.

b. Study area: Guwahati (Kamrup metro)
Guwahati (previously spelled Gauhati) is a major city in eastern India, with a population of 818,809 (2001 census) and density of 2010 per sq km, Kamrup (metro) ranks first among all the districts of Assam. This is the largest city in the North-East Region of India, considered by some to be the "gateway" to the region. Dispur, the capital of the Indian state of Assam, is located within the city. Guwahati is one of the most rapidly growing cities in India; during the past few decades it has experienced expansion and also a steep rise in population. According to a survey done by a UK media outlet, Guwahati is among the 100 fastest growing cities of the world, and is the 5th fastest growing among Indian cities.

The city sits between the southern bank of the Brahmaputra river and the foothills of the Shillong plateau, with LGB International Airport to the west, and the town of Narengi to the east. The name Guwahati is derived from two Assamese words: 'guwa' (areca nut) and 'haat' (market place). The name 'used to be spelled as Gowhatty (pre-colonial and colonial), standardized to Gauhati (colonial-British), which was then changed to the present form in the late 1980s to conform to the local pronunciation.
Guwahati's 'urban form' is somewhat like a starfish. With a core in the central areas, the city has tentacles extending in the form of growth corridors towards south, east and west. In the past few decades, southern Guwahati areas such as Ganeshguri, Beltola, Panjabari, etc. began forming a southern sub-center surrounding the capital complex at Dispur, principally depending on the GS Road corridor. The core area consists of the old city with Pan Bazaar, Paltan Bazaar, Fansi bazaar and Ujan bazaar, each one facilitating unique urban activities. While Paltan bazaar is the hub for transportation and hotels, Panbazaar is centered around educational, administrative, cultural activities, offices and restaurants. Fansi bazaar is the hub for retail and wholesale commercial activities, and Ujan bazaar mainly contains administrative, retail and residential areas. With these bustling areas, the city core is a busy and lively part of the Guwahati. Ulubari, Lachit Nagar, Chandmari and Zoo Road (R.G. Baruah Road), which have a mix of retail-commercial and residential areas, can be considered an additional part of the core. Guwahati is one of the most rapidly growing cities in India. The city's population grew from just two-hundred thousand in 1971 to more than five-hundred thousand in 1991, and in the census of 2001 the city's population was found to be 808,021. By 2011, it is estimated that Guwahati will boast more than a million residents. In 2001, males constituted 55 percent and females at 45 percent of Guwahati residents. It was found that 10 percent of the population is less than 6 years of age. Guwahati has an average literacy rate of 78 percent, with male literacy at 81 and female literacy at 74 percent. Although being a medium sized city, ranking around 50th (in terms of population) in India, the city's quality of life is comparatively higher. A recent survey (2006) by a popular Indian magazine -Outlook (Money) ranked Guwahati 17th among all the major and medium sized Indian cities. The city provides competitive residential and working environments with beautiful landscapes, pleasant climate, modern shopping areas, modern apartments and bungalows, and considerably good social infrastructure (Buaruah, 1993).
**Statistical consideration**

The following statistical methods are incorporated to interpret the data:

a. **Mean:** Mean is the central value of a distribution. It is calculated by the following formula:

\[
\text{Mean, } \overline{X} = \frac{\sum X}{n}
\]

Here, \( \sum X \) = Total of the values
\( n \) = Total number of observation.

b. **Standard deviation:** Standard deviation is a measure of the extent to which the individual items vary. It is calculated by the formula:

\[
S.D. = \sigma = \sqrt{\frac{\sum (X-\overline{X})^2}{n}}
\]

Here, \( \overline{X} \) is the mean, \( 'X' \) is the individual observation; and \( 'n' \) is the total number of observation.

c. **Standard error:** It is the standard deviation of the sampling distribution of the means. The formula of standard error is:

\[
\text{SE} = \frac{SD}{\sqrt{n}}
\]

Where, SD is the standard deviation and \( 'n' \) is the sample size.

d. **Chi-square (\( \chi^2 \)) test:** The \( \chi^2 \) test is one of the simplest and most widely used non-parametric tests in statistical work. It is performed when one wishes to find out if there exists an association between two or more discrete variables.

The formula is as follows:

\[
\chi^2 = \sum \frac{(O-E)^2}{E}
\]

Here, \( 'O' \) refers to the deserved frequencies; and \( 'E' \) refers to the expected frequencies.

The value of \( \chi^2 \) obtained is the checked against the degree of freedom in the chart to get level of significance and probability. The degree of freedom to be used is obtained by multiplying the value (column-1) with (row-1).

e. **t-test:** For the purpose of comparison among the various divisions the ‘t’ test of significance have been applied. The formula used for t-test is

\[
t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{(S.E_1^2 + S.E_2^2)}}
\]

Here, \( \overline{X}_1 \) and \( \overline{X}_2 \) stand for mean values of the two samples. \( S.E_1 \) and \( S.E_2 \) stand for the standard error of the two mean values respectively.
f. Tukey-Kramer multiple comparison test: Tukey–Kramer method, is a multiple comparison test which is used to determine whether three or more means differ significantly in an analysis of variance. This test was performed using ANOVA. The formula for Tukey's test is:

\[ q_s = \frac{Y_A - Y_B}{SE} \]

Where, \( Y_A \) is the larger of the two means being compared, \( Y_B \) is the smaller of the two means being compared, and \( SE \) is the standard error of the data in question.

Planning of the thesis

The present thesis consists of four chapters. The first chapter gives the general introduction of the subject with special reference to the disease. The chapter also deals with the importance and objectives of study along with a brief description of the area of study as well as the study populations. This chapter also includes the nature, sources, methods of data collection and methods of data analysis. Chapter-II includes the review of literature which also examines the research works carried out by anthropologists and other scientists. Chapter-III shows a general demographic profile of all the three experimental and controlled groups. The findings of the present study are presented in chapter-IV. Chapter-V discusses the findings of the present study in the light of other studies. The summary and conclusions are given in chapter-VI.