

1. Introduction, Objectives and Rationale

1.1 Introduction

Polycystic ovary syndrome(PCOS) is metabolic syndrome characterized by unovulation, hyperandrogenism and PCOS exists commonly among women at reproductive age with an incidence rate of 6-10%. The clinical manifestation of PCOS include oligomenorrhea, infertility, acne, hirsutism and fat. In addition these patients may develop with many other related endocrine and metabolic diseases and have an increased risk of suffering endometrial cancer, impaired glucose tolerance, diabetes and cardiovascular disease (Danferg and xuelian, 2013).

There are three primary characteristics associated with PCOS, hyperandrogenism means that there is an excessive amount of androgen such as testosterone, dihydrotestosterone (DHT) and androstenedione. Clinical manifestations of hyperandrogenism include hirsutism (excessive growth of hair), acne, androgenic alopecia (male pattern characteristic), oligomenorrhea or amenorrhea is other characteristics of PCOS, oligomenorrhea refers to infrequent menstruation, while amenorrhea is absence of menstrual period. These conditions are due to hormone imbalance. Elevated circulating androgen levels are observed in 80-90% of women with oligomenorrhea as elevated levels of free testosterone account for the vast majority of abnormal findings in the laboratory examination. A number of women with PCOS also have underactive thyroid glands according to some research (Shirsath et al., 2015) it has been found that hypothyroidism can lead to reduction of sex hormone binding globulin and increase free testosterone, free testosterone is one of the factors contributing to PCOS symptoms. Dysfunction and anatomic abnormalities of the thyroid are among the most common diseases of the endocrine gland. Abnormalities in the supply of the thyroid hormone to the

peripheral tissue are associated with alteration in number of metabolic processes. The major effect of abnormal thyroid level relates largely to changes in ovulation and menstruation. Ovulation may be impaired by changes in the production of sex hormone binding globulin (SHBG) follicle stimulating hormone FSH and androgen. The body compensates by altering the production of thyroid releasing hormone TRH from the hypothalamus. The change in the TRH with affect feed back loop between the hypothalamus pituitary and the ovary leading to changes in ovulation and menstruation. These changes can be subtle especially when symptoms of thyroid dysfunction are not obvious and don't lead to changes in menses or ovulation. Early stage of thyroid dysfunction (before symptoms are manifest) can lead to subtle changes in ovulation and endometrial receptivity, which then may have profound effects on fertility. Thyroid hormone interact with reproductive hormones estrogen and progesterone to preserve normal function of the ovaries and maturation of the egg (Krasses et al., 2010). Thyroid dysfunction is an underactive thyroid, if thyroid is underactive the hypothalamus and pituitary gland can sense this and try to kick things back to normal by increasing levels of the hormone thyroid releasing hormone TRH and TSH. TRH produced by hypothalamus prompts the pituitary to release TSH which in turn stimulates the thyroid to do its job. However TRH also prompts the pituitary to release more of the hormone prolactin, elevation of prolactin can interfere with ovulation by suppressing release of the hormones LH and FSH which stimulate the ovary. Low level of thyroid hormone can also interfere with rate at which your body metabolizes sex hormone which can also cause ovulatory disorder (Dileep., 2012).

1.2 Rationale:

The polycystic ovary syndrome (PCOS) is a combination of hyperandrogenism (hirsutism and acne) and anovulation associated with androgen excess . It is the main gynecological endocrinopathy of reproductive age, affecting 6% - 10% of women . It is the most common cause of infertility due to anovulation. In many countries, it represents the leading cause of female infertility (Spritzer., 2002).PCOS is important public health problem , little information is available in sudanese women in assessment pcos so it very important to evaluate essential parameters.To my knowledge there are few published studies about this in sudan so this study may help to provide the monitoring of TFT in PCOS women.

1.3Objective:

1.3.1General Objective:

-To assess serum level of Thyroid hormones among Sudanese women with newly diagnostic polycystic ovary syndrome.

1.3.2Specific Objectives:

1\ To estimate and compare serum level of thyroid hormones (TSH-TT3-TT4) in study group (patients and control).

2\To detect the frequency of thyroid dysfunction among polycystic ovary syndrome patients(hypothyroidism, Hyperthyroidism) .

3\To correlate between Thyroid hormones (TSH, TT4, TT3) and body mass index(BMI) in polycystic ovary syndrome.

4\To compare BMI among Sudanese patients with polycystic ovary syndrome according to PCO (bilateral / unilateral) and menstrual cycle (irregular-regular).

2. Literature Review

2.1 Thyroid gland

The thyroid gland or simply the thyroid is an endocrine gland in the neck, consisting of two lobes connected by an isthmus. It is found at the front of the neck, below the Adam's apple. The thyroid gland secretes thyroid hormones, which primarily influence the metabolic rate and protein synthesis. The hormones also have many other effects including those on development. The thyroid hormones triiodothyronine (T_3) and thyroxine (T_4) are created from iodine and tyrosine. The thyroid also produces the hormone calcitonin, which plays a role in calcium homeostasis (Hall and John, 2011).

Hormonal output from the thyroid is regulated by thyroid-stimulating hormone (TSH) secreted from the anterior pituitary gland, which itself is regulated by thyrotropin-releasing hormone (TRH) produced by the hypothalamus(Boron et al., 2012).

The thyroid may be affected by several diseases. Hyperthyroidism occurs when the gland produces excessive amounts of thyroid hormones, the most common cause being Graves' disease an autoimmune disorder. In contrast, hypothyroidism is a state of insufficient thyroid hormone production. Worldwide, the most common cause is iodine deficiency. Thyroid hormones are important for development, and hypothyroidism secondary to iodine deficiency remains the leading cause of preventable intellectual disability. In iodine-sufficient regions, the most common cause of hypothyroidism is Hashimoto's thyroiditis also an autoimmune disease. In addition, the thyroid gland may also develop several types of nodules and cancer (longo et al . ,2011).

2.1.1 Microanatomy of thyroid gland

At the microscopic level, there are three primary features of the thyroid follicles, follicular cells, and parafollicular cells, first discovered by Geoffery Websterson in 1664.(Fawcett et al., 2002)

***Follicles**

Thyroid follicles are small spherical groupings of cells 0.02–0.9mm in diameter that play the main role in thyroid function. They consist of a rim that has a rich blood supply, nerve and lymphatic presence, that surrounds a core of colloid that consists mostly of thyroid hormone precursor proteins called thyroglobulin, an iodinatedglycoprotein.(Susan and Neil, 2008)

***Follicular cells**

The core of a follicle is surrounded by a single layer of follicular cells. When stimulated by thyroid stimulating hormone (TSH), these secrete the thyroid hormones T3 and T4. They do this by transporting and metabolising the thyroglobulin contained in the colloid. Follicular cells vary in shape from flat to cuboid to columnar, depending on how active they are.(Susan and Neil, 2008)

***Parafollicular cells**

Scattered among follicular cells and in spaces between the spherical follicles are another type of thyroid cell, parafollicular cells. These cells secrete calcitonin and so are also called C cell.(Susan and Neil, 2008) .

2.1.2 Development of thyroid gland

In the development of the embryo, at 3–4 weeks gestational age, the thyroid gland appears as an epithelial proliferation in the floor of the pharynx at the base of the tongue between the tuberculum impar and the copula linguae. The copula soon

becomes covered over by the hypopharyngeal eminence at a point later indicated by the foramen cecum. The thyroid then descends in front of the pharyngeal gut as a bilobed diverticulum through the thyroglossal duct. Over the next few weeks, it migrates to the base of the neck, passing in front of the hyoid bone. During migration, the thyroid remains connected to the tongue by a narrow canal, the thyroglossal duct. At the end of the fifth week the thyroglossal duct degenerates and the detached thyroid continues on to its final position over the following two weeks. The fetal hypothalamus and pituitary start to secrete thyrotropin-releasing hormone (TRH) and thyroid-stimulating hormone (TSH). TSH is first measurable at 11 weeks. By 18–20 weeks, the production of thyroxine (T_4) reaches a clinically significant and self-sufficient level. Fetal triiodothyronine (T_3) remains low, less than 15 ng/dL until 30 weeks, and increases to 50 ng/dL at full-term. The fetus needs to be self-sufficient in thyroid hormones in order to guard against neurodevelopmental disorders that would arise from maternal hypothyroidism. The presence of sufficient iodine is essential for healthy neurodevelopment (Shoback et al., 2011)

The neuroendocrine parafollicular cells, also known as C cells, responsible for the production of calcitonin, are derived from neural crest cells, which migrate to the pharyngeal arches. This part of the thyroid then first forms as the ultimopharyngeal body, which begins in the ventral fourth pharyngeal pouch and joins the primordial thyroid gland during its descent to its final location. Aberrations in prenatal development can result in various forms of thyroid dysgenesis which can cause congenital hypothyroidism, and if untreated this can lead to cretinism (Shoback et al., 2011).

2.1.3 Functions of thyroid gland

The thyroid hormones T_3 and T_4 have a number of metabolic, cardiovascular and developmental effects on the body. The production is stimulated by release of thyroid stimulating hormone (TSH), which in turn depends on release of thyrotropin releasing hormone (TRH). Every downstream hormone has negative feedback and decreases the level of the hormone that stimulates its release. The primary function of the thyroid is the production of the iodine-containing thyroid hormones, triiodothyronine (T_3) and thyroxine (T_4) and the peptide hormone calcitonin (Britton et al., 2010). T_3 is so named because it contains three atoms of iodine per molecule and T_4 contains four atoms of iodine per molecule. The thyroid hormones have a wide range of effects on the human body. These include Metabolic, The thyroid hormones increase the basal metabolic rate and have effects on almost all body tissues (Hall and John, 2011). Appetite, the absorption of substances, and gut motility are all influenced by thyroid hormones. They increase the absorption in the gut, generation, uptake by cells, and breakdown of glucose. They stimulate the breakdown of fats, and increase the number of free fatty acids. Despite increasing free fatty acids, thyroid hormones decrease cholesterol levels, perhaps by increasing the rate of secretion of cholesterol in bile. Cardiovascular, The hormones increase the rate and strength of the heartbeat. They increase the rate of breathing, intake and consumption of oxygen, and increase the activity of mitochondria. Combined, these factors increase blood flow and the body's temperature (Hall and John, 2011). Developmental, Thyroid hormones are important for normal development. They increase the growth rate of young people, and cells of the developing brain are a major target for the thyroid hormones T_3 and T_4 . Thyroid hormones play a particularly crucial role in brain maturation during fetal development. The thyroid hormones also play a role in maintaining

normal sexual function, sleep, and thought patterns. Increased levels are associated with increased speed of thought generation but decreased focus. Sexual function, including libido and the maintenance of a normal menstrual cycle, are influenced by thyroid hormones. (Hall and John, 2011).After secretion, only a very small proportion of the thyroid hormones travel freely in the blood. Most are bound to thyroxine-binding globulin (about 70%), transthyretin (10%), and albumin (15%) . Only the 0.03% of T_4 and 0.3% of T_3 traveling freely has hormonal activity .In addition, up to 85% of the T_3 in blood is produced following conversion from T_4 by iodothyronine deiodinases in organs around the body (Brittonet al .,2010).Thyroid hormones act by crossing the cell membrane and binding to intracellularnuclearthyroid hormone receptors $TR-\alpha_1$, $TR-\alpha_2$, $TR-\beta_1$ and $TR-\beta_2$, which bind with hormone response elements and transcription factors to modulate DNA transcription . In addition to these actions on DNA, the thyroid hormones also act within the cell membrane or within cytoplasm via reactions with enzymes, including calcium ATPase, adenylyl cyclase, and glucose transporter (Shobak et al ., 2011)

2.1.4 Synthesis of thyroid hormones

The thyroid hormones are created from thyroglobulin. This is a protein within the follicular space that is originally created within the rough endoplasmic reticulum of follicular cells and then transported into the follicular space. Thyroglobulin contains 123 units of tyrosine, which reacts with iodine within the follicular space (Bianco et al., (2002).Iodine is essential for the production of the thyroid hormones. Iodine travels in the blood as iodide (I^-), which is taken up into the follicular cells by a sodium-iodide symporter. This is an ion channel on the cell membrane which in the same action transports two sodium ions and an iodide ion into the cell. Iodide then travels from within the cell into the follicular space,

through the action of pendig, an iodide-chloride antiporter. In the follicular space, the iodide is then oxidized to iodine. This makes it more reactive, and the iodine is attached to the active tyrosine units in thyroglobulin by the enzyme thyroid peroxidase. This forms the precursors of thyroid hormones moniodotyrosine (MIT), and diiodotyrosine (DIT) (Boron et al .,2012).When the follicular cells are stimulated by thyroid-stimulating hormone, the follicular cells reabsorb thyroglobulin from the follicular space. The iodinated tyrosines are cleaved, forming the thyroid hormones T4, T3, DIT, MIT, and traces of reverse triiodothyronine. T3 and T4 are released into the blood. The hormones secreted from the gland are about 80–90% T4 and about 10–20% T3. Deiodinase enzymes in peripheral tissues remove the iodine from MIT and DIT and convert T4 to T3 and RT3. is a major source of both RT3 (95%) and T3 (87%) in peripheral tissues (Bianco et al.,2002).

2.1.5 Regulation of thyroid hormones

The production of thyroxine and triiodothyronine is primarily regulated by thyroid-stimulating hormone (TSH), released by the anterior pituitary gland. TSH release in turn is stimulated by thyrotropin releasing hormone (TRH), released in a pulsatile manner from the hypothalamus. The thyroid hormones provide negative feedback to the thyrotropes TSH and TRH: when the thyroid hormones are high, TSH production is suppressed. This negative feedback also occurs when levels of TSH are high, causing TRH production to be suppressed.(shoback et al ., 2011)

),TRH is secreted at an increased rate in situations such as cold exposure in order to stimulate thermogenesis. In addition to being suppressed by the presence of thyroid hormones, TSH production is blunted by dopamine, somatostatin, and glucocorticoids (Longo et al., 2011,).

2.1.6 Calcitonin

The thyroid gland also produces the hormone calcitonin, which helps regulate blood calcium levels. Parafollicular cells produce calcitonin in response to high blood calcium. Calcitonin decreases the release of calcium from bone, by decreasing the activity of osteoclasts, cells which break down bone. Bone is constantly reabsorbed by osteoclasts and created by osteoblasts, so calcitonin effectively stimulates movement of calcium into bone. The effects of calcitonin are opposite those of the parathyroid hormone, produced in the parathyroid glands. However, calcitonin seems far less essential than PTH, as calcium metabolism remains clinically normal after removal of the thyroid (thyroidectomy), but not the parathyroid glands.(Hall and John, 2011).

2.1.7 Thyroid diseases

I. Hyperthyroidism

Excessive production of the thyroid hormones is called hyperthyroidism, which is most commonly a result of Graves' disease, a toxic multinodular goitre, a solitary thyroid adenoma, or inflammation. Other causes include drug-induced excess of iodine, particularly from amiodarone, an antiarrhythmic medication; an excess caused by the preferential uptake of iodine by the thyroid following iodinated contrastimaging; or from pituitary adenomas which may cause an overproduction of thyroid stimulating hormone. Hyperthyroidism often causes a variety of non-specific symptoms including weight loss, increased appetite, insomnia, decreased tolerance of heat, tremor, palpitations, anxiety and nervousness. In some cases it can cause chest pain, diarrhoea, hair loss and muscle weakness. Such symptoms may be managed temporarily with drugs such as beta blockers.(Britton et al., 2010).

II. Hypothyroidism

An underactive thyroid gland results in hypothyroidism. Typical symptoms are abnormal weight gain, tiredness, constipation, heavy menstrual bleeding, hair loss, cold intolerance, and a slow heart rate. Iodine deficiency is the most common cause of hypothyroidism worldwide, and the autoimmune disease Hashimoto's thyroiditis is the most common cause in the developed world. Other causes include congenital abnormalities, diseases causing transient inflammation, surgical removal or radioablation of the thyroid, the drugs amiodarone and lithium, amyloidosis, and sarcoidosis. Some forms of hypothyroidism can result in myxedema and severe cases can result in myxedema coma. Hypothyroidism is managed with replacement of the hormone thyroxine. This is usually given daily as an oral supplement, and may take a few weeks to become effective. Some causes of hypothyroidism, such as Postpartum thyroiditis and Subacute thyroiditis may be transient and pass over time, and other causes such as iodine deficiency may be able to be rectified with dietary supplementation (Britton et al., 2010).

III. Swelling of thyroid gland

An enlarged thyroid gland is called a goitre. Goitres are present in some form in about 5% of people,] and are the result of a large number of causes, including iodine deficiency, autoimmune disease (both Grave's disease and Hashimoto's thyroiditis), infection, inflammation, and infiltrative disease such as sarcoidosis and amyloidosis. Sometimes no cause can be found, a state called "simple goitre". Some forms of goitre are associated with pain, whereas many do not cause any symptoms. Enlarged goitres may extend beyond the normal position of the thyroid gland to below the sternum, around the airway or esophagus. Goitres may be associated with hyperthyroidism or hypothyroidism, relating to the underlying cause of the goitre. Thyroid function tests may be done to investigate the cause and

effects of the goitre. The underlying cause of the goitre may be treated, however many goitres with no associated symptoms are simply monitored. .(Britton et al ., 2010).

IV. Inflammation of thyroid gland

Inflammation of the thyroid is called thyroiditis. Inflamed thyroids may cause symptoms of hyperthyroidism or hypothyroidism. Two types thyroiditis initially present with hyperthyroidism and are sometimes followed by a period of hypothyroidism – Hashimoto's thyroiditis and postpartum thyroiditis. There are other disorders that cause inflammation of the thyroid, and these include subacute thyroiditis, acute thyroiditis, silent thyroiditis, Riedel's thyroiditis and traumatic injury, including palpation thyroiditis. Hashimoto's thyroiditis is an autoimmune disorder in which the thyroid gland is infiltrated by the lymphocytes B-cell and T-cells. These progressively destroy the thyroid gland.¹ In this way, Hashimoto's thyroiditis may have occurred insidiously, and only be noticed when thyroid hormone production decreases, causing symptoms of hypothyroidism.¹ Hashimoto's is more common in females than males, much more common after the age of 60, and has known genetic risk factors. Also more common in individuals with Hashimoto's thyroiditis are type 1 diabetes, pernicious anaemia, Addison's disease vitiligo (Longo et al ., 2011,) .

V. Graves Disease

Graves' disease is an autoimmune disorder that is the most common cause of hyperthyroidism. In Graves' disease, for an unknown reason autoantibodies develop against the thyroid stimulating hormone receptor. These antibodies activate the receptor, leading to development of a goitre and symptoms of hyperthyroidism, such as heat intolerance, weight loss, diarrhoea and palpitations. Occasionally such antibodies block but do not activate the receptor, leading to symptoms associated with hypothyroidism. In addition, gradual protrusion of the eyes may occur, called Graves' ophthalmopathy, as may swelling of the front of the shins. Graves' disease can be diagnosed by the presence of pathognomonic features such as involvement of the eyes and shins, or isolation of autoantibodies, or by results of a radiolabelled uptake scan. Graves' disease is treated with anti-thyroid drugs such as propylthiouracil, which decrease the production of thyroid hormones, but hold a high rate of relapse. If there is no involvement of the eyes, then use of radioactive isotopes to ablate the gland may be considered. Surgical removal of the gland with subsequent thyroid hormone replacement may be considered, however this will not control symptoms associated with the eye or skin.(Smith et al .,2016)

VI. Thyroid nodules

Thyroid nodules are often found on the gland, with a prevalence of 4–7%.The majority of nodules do not cause any symptoms and are non-cancerous. Non-cancerous cases include simple cysts, colloid nodules, and thyroid adenomas. Malignant nodules, which only occur in about 5% of nodules, include follicular, papillary, medullary carcinomas and metastases from other sites. Nodules are more likely in females, those who are exposed to radiation, and in those who are iodine deficient..When a nodule is present, thyroid function tests are performed and reveal

whether a person has a normal amount of thyroid hormones ("euthyroid") or an excess of hormones, usually secreted by the nodule, causing hyperthyroidism. When the thyroid function tests are normal, an ultrasound is often used to investigate the nodule, and provide information such as whether the nodule is fluid-filled or a solid mass, and whether the appearance is suggestive of a benign or malignant cancer. A needle aspiration biopsy may then be performed, and the sample undergoes cytology, in which the appearance of cells is viewed to determine whether they resemble normal or cancerous cells. There can be many nodules, which is termed a multinodular goitre, and this can sometimes be a toxic multinodular goitre (Britton et al ., 2010).

VII. Thyroid cancer

The most common neoplasm affecting the thyroid gland is a benign adenoma, usually presenting as a painless mass in the neck. Malignant thyroid cancers are most often carcinomas, although cancer can occur in any tissue that the thyroid consists of, including cancer of C-cells and lymphomas. Cancers from other sites also rarely lodge in the thyroid. Radiation of the head and neck presents a risk factor for thyroid cancer, and cancer is more common in women than men, occurring at a rate of about 2:1.(Long et al ., 2011) In most cases, thyroid cancer presents as a painless mass in the neck. It is very unusual for thyroid cancers to present with other symptoms, although in some cases cancer may cause hyperthyroidism. Most malignant thyroid cancers are papillary, followed by follicular, medullary, and thyroid lymphoma. Because of the prominence of the thyroid gland, cancer is often detected earlier in the course of disease as the cause of a nodule, which may undergo fine needle aspiration. Thyroid function tests will help reveal whether the nodule produces excess thyroid hormones. A radioactive iodine uptake test can help reveal the activity and location of the cancer and

metastases.(Britton et al ., 2010)Thyroid cancers are treated by removing the whole or part of thyroid gland. Radioactive Iodine 131 may be given to radioablate the thyroid. Thyroxine is given to replace the hormones lost and to suppress TSH production, as TSH may stimulate recurrence. With the exception of the rare anaplastic thyroid cancer, which carries a very poor prognosis, most thyroid cancers carry an excellent prognosis and can even be considered curable. (Inigo et al., 2011)

VIII. Congenital disorder of thyroid gland

A persistent thyroglossal duct is the most common clinically significant congenital disorder of the thyroid gland. A persistent sinus tract may remain as a vestigial remnant of the tubular development of the thyroid gland. Parts of this tube may be obliterated, leaving small segments to form thyroglossal cysts. Preterm neonates are at risk of hypothyroidism as their thyroid glands are insufficiently developed to meet their postnatal needs. In order to detect hypothyroidism in newborn babies, to prevent growth and development abnormalities in later life, many countries have newborn screening programs at birth. Infants with thyroid hormone deficiency (congenital hypothyroidism) can manifest problems of physical growth and development as well as brain development, termed cretinism. Children with congenital hypothyroidism are treated supplementally with levothyroxine, which facilitates normal growth and development.(Shoback et al ., 2011).Mucinous, clear secretions may collect within these cysts to form either spherical masses or fusiform swellings, rarely larger than 2 to 3 cm in diameter. These are present in the midline of the neck anterior to the trachea. Segments of the duct and cysts that occur high in the neck are lined by stratified squamous epithelium, which is essentially identical to that covering the posterior portion of the tongue in the region of the foramen cecum. The disorders that occur in the lower neck more proximal to the thyroid gland are lined by epithelium resembling the thyroidal acinar epithelium. Characteristically,

next to the lining epithelium, there is an intense lymphocytic infiltrate. Superimposed infection may convert these lesions into abscess cavities, and rarely, give rise to cancers. Another disorder is that of thyroid dysgenesis which can result in various presentations of one or more misplaced accessory thyroid glands. These can be asymptomatic. (Susan and Neil, 2008) .

2.1.8 Tests of thyroid gland

A number of tests that can be used to test the function of the thyroid, for the presence of diseases, and for the success or failure of treatment. Blood tests in general aim to measure thyroid function or determine the cause of thyroid dysfunction. Thyroid function tests include a battery of blood tests including the measurement of the thyroid hormones T3 and T4, as well as the measurement of TSH. They may reveal hyperthyroidism (high T3 and T4), hypothyroidism (low T3, T4), or subclinical hyperthyroidism (normal T3 and T4 with a low TSH). TSH levels are considered the most sensitive marker of thyroid dysfunction. They are however not always accurate, particularly if the cause of hypothyroidism is thought to be related to insufficient TRH secretion, in which case it may be low or falsely normal. In such a case a TRH stimulation test, in which TRH is given and TSH levels are measured at 30 and 60-minutes after, may be conducted.(Shoback et al., 2011).T3 and T4 can be measured directly. However, as the two thyroid hormones travel bound to other molecules, and it is the "free" component that is biologically active, free T3 and free T4 levels can be measured. T4 is preferred, because in hypothyroidism T3 levels may be normal. The ratio of bound to unbound thyroid hormones is known as the thyroid hormone binding ratio (THBR). It is also possible to measure directly the main carriers of the thyroid hormones, thyroglobulin and thyroxine-binding globulin. Thyroglobulin will also be measurable in a healthy thyroid, and will increase with inflammation, and may also be used to measure the success of thyroid removal or ablation. If successful, thyroglobulin should be undetectable. Lastly, antibodies against components of the thyroid, particularly anti-TPO and anti-thyroglobulin, can be measured. These may be present in normal individuals but are highly sensitive for autoimmune-related disease(longo et al., 2011).

Ultrasound of the thyroid may be used to reveal whether structures are solid or filled with fluid, helping to differentiate between nodules and goitres and cysts. It may also help differentiate between malignant and benign lesions. A fine needle aspiration biopsy may be taken concurrently of thyroid tissue to determine the nature of a lesion. These biopsies are then sent for histopathology and cytology. When further imaging is required, a radiolabelled iodine-123 or technetium-99 uptake scan may take place. This can determine the size and shape of lesions, reveal whether nodules or goitres are metabolically active, and reveal and monitor sites of thyroid disease or cancer deposits outside the thyroid (Shoback et al., 2011).

2.2 Polycystic ovary syndrome:

The polycystic ovary syndrome PCOS is conventionally defined as a combination of hyperandrogenism (hirsutism and acne) and anovulation (oligomenorrhea, infertility, and dysfunctional uterine bleeding) with polycystic ovaries At ultrasound (Franks.,1989). It is the main gynecological endocrinopathy of reproductive age, affecting 6% - 10% of women . It is the most common cause of infertility due to anovulation. In many countries, it represents the leading cause of female infertility (Spritzer.,2002).

The specific pathophysiology of this syndrome has not yet been established, however it is associated with the presence of insulin resistance, obesity, diabetes mellitus type 2, dyslipidemia, metabolic syndrome, hypertension, cardiovascular disease, hyperplasia and endometrial carcinoma (Azziz R .,2006).

When it is considered in the presence of menstrual disorder, diagnosis of PCOS is obtained in 30% - 40% of patients with primary or secondary amenorrhoea and in 80% of patients with oligomenorrhea .they considered the syndrome as an androgen excess disorder and its fundamental characteristics: menstrual or

ovulatory dysfunction, hyperandrogenemia, clinical hyperandrogenism and polycystic ovaries. Further, the association pointed out that, the resulting phenotypes from the combination of such characteristics, as a group, but not necessarily individually, have insulin resistance and attendant risk of metabolic abnormalities (Diamanti et al., 2006).

2.2.1 Signs and symptoms of polycystic ovary syndrome

Common signs and symptoms of PCOS include the following, Menstrual disorders, PCOS mostly produces oligomenorrhea (fewer than nine menstrual periods in a year) or amenorrhea (no menstrual periods for three or more consecutive months), but other types of menstrual disorders may also occur. Infertility, This generally results directly from chronic anovulation (lack of ovulation). High levels of masculinizing hormones: Known as hyperandrogenism, the most common signs are acne and hirsutism (male pattern of hair growth, such as on the chin or chest), but it may produce hypermenorrhea (heavy and prolonged menstrual periods), androgenic alopecia (increased hair thinning or diffuse hair loss), or other symptoms. Approximately three-quarters of women with PCOS (by the diagnostic criteria of national institute of health NIH/ and national institute of health consensus definition NICHD 1990) have evidence of hyperandrogenemia. Metabolic syndrome. This appears as a tendency towards central obesity and other symptoms associated with insulin resistance. Serum insulin, insulin resistance, and homocysteine levels are higher in women with PCOS (Teede., 2010)

2.2.2 Cause of polycystic ovary syndrome

PCOS is a heterogeneous disorder of uncertain cause. There is some evidence that it is a genetic disease. Such evidence includes the familial clustering of cases, greater concordance in monozygotic compared with dizygotic twins and

heritability of endocrine and metabolic features of PCOS (Legro .,2002).The genetic component appears to be inherited in an autosomal dominant fashion with high genetic penetrance but variable expressivity in females; this means that each child has a 50% chance of inheriting the predisposing genetic variant(s) from a parent, and, if a daughter receives the variant(s), the daughter will have the disease to some extent. The genetic variant(s) can be inherited from either the father or the mother, and can be passed along to both sons (who may be asymptomatic carriers or may have symptoms such as early baldness and/or excessive hair) and daughters, who will show signs of PCOS. The phenotype appears to manifest itself at least partially via heightened androgen levels secreted by ovarian follicle theca cells from women with the allele. The exact gene affected has not yet been identified. In rare instances, single-gene mutations can give rise to the phenotype of the syndrome. Current understanding of the pathogenesis of the syndrome suggests, however, that it is a complex multigenic disorder.The severity of PCOS symptoms appears to be largely determined by factors such as obesity. PCOS has some aspects of a metabolic disorder, since its symptoms are partly reversible. Even though considered as a gynecological problem, PCOS consists of 28 clinical symptoms.Even though the name suggests that the ovaries are central to disease pathology, cysts are a symptom instead of the cause of the disease. Some symptoms of PCOS will persist even if both ovaries are removed; the disease can appear even if cysts are absent. Since its first description by Stein and Leventhal in 1935, the criteria of diagnosis, symptoms, and causative factors are subject to debate. Gynecologists often see it as a gynecological problem, with the ovaries being the primary organ affected. However, recent insights show a multisystem disorder, with the primary problem lying in hormonal regulation in the hypothalamus, with the involvement of many organs. The name PCOD is used when there is ultrasonographic evidence. The term PCOS is used since there is a

wide spectrum of symptoms possible, and cysts in the ovaries are seen only in 15% of people. PCOS may be related to or worsened by exposures during the prenatal period, epigenetic factors, environmental impacts (especially industrial endocrine disruptors such as bisphenol A and certain drugs) and the increasing rates of obesity. (Rutkowska and Rachoń, 2014).

2.2.3 Pathogenesis of polycystic ovary syndrome

It is believed that it is a complex multigenic disorder, including abnormalities in the hypothalamic-pituitary axis, steroidogenesis and insulin resistance. Abnormal Steroidogenesis Most of authors consider that abnormal steroidogenesis of ovarian or adrenal origin is the primary disorder PCOS. High concentrations of circulating testosterone and dehydroepiandrosterone (DHEA) occur in 60% to 80% and 20% to 25% of women with PCOS, respectively (Hoyt et al., 2004). Insulin Resistance, In the last decade, it has been observed that the majority of women with PCOS presents some degree of insulin resistance, even non obese. Studies suggest the existence of genetic predisposition, which ends up manifesting as a result of life style and obesity . The resulting hyperinsulinemia insulin resistance causes an increase in both the production of androgens as in the biologically active portion. The joint mechanism proposed for this could be a relation with the changes in swimming-insulin receptors and the enzyme that regulates adrenal and ovarian androgen production . Abnormalities in Pituitary Function, The clutter in the release of gonadotropins: luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the pituitary have been implicated in the pathogenesis of PCOS. In almost patients with PCOS, the relation of LH/FSH is altered, being higher the LH secretion in relation to FSH, resulting in an increased production of androgens by theca cells, and anovulatory cycles. However, more recent studies have shown that these changes in LH levels are a secondary event and non-

primary. The excess androgen changes the regulation of female hormones, resulting in increased estrogen levels, menstrual irregularity and infertility. Genetic Factors, The type of genetic inheritance is polygenic in most of the cases, and the genes most frequently associated with PCOS are related to the biosynthesis, action and regulation of androgens, genes involved in insulin resistance and chronic inflammation and atherosclerosis (Escobar et al., 2011). Presently, the various clinical manifestations of this disease are responsible for making these women are considered an integral part of different phenotypes with the presence of hyperandrogenism, menstrual irregularity and changes of the ovaries on ultrasound. Familial occurrence is common, especially when there are first degree relatives (20% - 60%). Family Gene Mutation, suggests that PCOS is a complex disorder. Genomic variants in genes associated to the biosynthesis, to the regulation and action of androgens (CYP17, CP21, CP11 α , 17 β -HSD5, SHBG, receptor androgênico, 11 β -HSD and e H6PD), to the action and secretion of insulin (INSR, VNTR, IRS-1, IRS-2, CAPN10, PPAR γ , system IGF), to the secretion of gonadotropins and action (follistatin), and to the synthesis and retinoic acid metabolism, as well as pro-inflammatory genotypes (Variants of the genes of TNF-, IL-6) might be involved in genetic predisposition PCOS. (San Millán et al., 2005)

2.2.4 Clinical Manifestation of polycystic ovary syndrom

Dermatological clinical manifestations of hyperandrogenism include: hirsutism, acne, seborrhea, alopecia and, in severe cases, signs of virilization. There is considerable heterogeneity in the clinical practice, as well as can be variation in the same patient over time. Moreover, hyperandrogenism cannot define peripheral manifestations as observed mainly in Asian women (Yildiz., 2006)

2.2.5 Standard assessment of polycystic ovary syndrome

History-taking, specifically for menstrual pattern, obesity, hirsutism and acne. A clinical prediction rule found that these four questions can diagnose PCOS with a sensitivity of 77.1% (95% confidence interval [CI] 62.7%–88.0%) and a specificity of 93.8% (95% CI 82.8%–98.7%). Gynecologic ultrasonography, specifically looking for small ovarian follicles. These are believed to be the result of disturbed ovarian function with failed ovulation, reflected by the infrequent or absent menstruation that is typical of the condition. Laparoscopic examination may reveal a thickened, smooth, pearl-white outer surface of the ovary. (This would usually be an incidental finding if laparoscopy were performed for some other reason, as it would not be routine to examine the ovaries in this way to confirm a diagnosis of PCOS.) Serum (blood) levels of androgens (hormones associated with male development), including androstenedione and testosterone may be elevated. The ratio of LH (Luteinizing hormone) to FSH (Follicle-stimulating hormone), when measured in international units, is elevated in women with PCOS (Teede et al., 2010). Associated conditions of polycystic ovary syndrome, Fasting biochemical screen and lipid profile, 2-Hour oral glucose tolerance test (GTT) in women with risk factors (obesity, family history, history of gestational diabetes) may indicate impaired glucose tolerance (insulin resistance) in 15–33% of women with PCOS and Glucose tolerance testing (GTT) instead of fasting glucose can increase diagnosis of impaired glucose tolerance and diabetes among people with PCOS according to a prospective controlled trial. Differential diagnosis of polycystic ovary syndrome, Other causes of irregular or absent menstruation and hirsutism, such as hypothyroidism, congenital adrenal hyperplasia (21-hydroxylase deficiency), Cushing's syndrome, hyperprolactinemia, androgen secreting neoplasms, and other pituitary or adrenal disorders (Teede et al., 2010).

2.2.6 Management of polycystic ovary syndrome

The primary treatments for PCOS include: lifestyle changes, medications and surgery. Goals of treatment may be considered under four categories: Lowering of insulin resistance levels, Restoration of fertility, Treatment of hirsutism or acne and Restoration of regular menstruation, and prevention of endometrial hyperplasia and endometrial cancer. In each of these areas, there is considerable debate as to the optimal treatment. One of the major reasons for this is the lack of large-scale clinical trials comparing different treatments. Smaller trials tend to be less reliable and hence may produce conflicting results. General interventions that help to reduce weight or insulin resistance can be beneficial for all these aims, because they address what is believed to be the underlying cause. As PCOS appears to cause significant emotional distress, appropriate support may be useful. (Lim DC et al., 2011).

2.2 Relationship Between polycystic ovary syndrome and thyroid disease:

PCOS and thyroid disease are two diseases that are often considered when a woman goes to doctor with missing periods and abnormal hair growth. Hypothyroidism and hyperthyroidism are the two types of thyroid disease which doctors will test for when deciding between thyroid disease and PCOS (Sinha et al., 2013). A number of women with polycystic ovary syndrome may also have underactive thyroid gland, it has been found that the hypothyroidism can lead to a reduction of sex hormone binding globulin and increase in free testosterone. Free testosterone is one of the factors contributing to PCOS symptoms. (Shirsath et al., 2015) Thyroid disorder and PCOS are of the most common endocrine disorder in general population. Although the etiopathogenesis of the thyroid disorder and PCOS is completely different, these two entities have many features in common. Increase in ovarian volume and cystic changes in ovaries have been reported in primary

hypothyroidism. in the other direction it increasing realized that thyroid disorder are more common with pcos as compare to the normal population .in the thyroid disorder (primary hypothyroidism) rise thyrotrophin realizing hormone lead to increase prolactin thyroid stimulating hormone prolactin contributes toward poly cystic ovarian morphology by inhibiting ovalution as the result of the chang ratio of follicle stimulating hormone and leutinizing hormone and increase dehydroepiandrosterone from the adrenal gland .the pathophysiological connecting of these two disorder has not been clearly delineated as now the most obvius conection perhaps is increase BMI and insulin resistant common to both condition (.sinha et al., 2013).

3-Materials and methods

3.1 Study design

This was analytical crosssectional casecontrol, hospital based studywhich was carried out during the period from February to May 2017.

3.2 Study area

This study was conducted in Elsir Abo Alhassan Center for Infertility in Khartoum state

3.3 Study population

The study included 50 sudanese women with PCOS(newly diagnosed)who were by obstetrician andgynecologist according to standard criteria and 50 sudanese women appertntly health age match as control.

3. 4 Inclusion criteria

Sudanese women newly diagnosed PCOS as case group and healthy women serve as control were included.

3.5 Exclusion criteria

Any patient with Diabetes mellitus, hyperprolactemia, congenital adrenal hyperplasia, thyroid disorders, Cushing syndrome, infection disease, hypertension were excluded from the study and pregnant women.

3.6 Ethical consideration

This study was approved by ethical committee college of medical laboratory science and verbal informed consent was obtained from all participants the objectives of the study were explained to all participants.

3.7 Data collection

first : an interview to obtain the clinical data was done for each participant ,questionnaire (appendix 1)was specifically design to help in either include or exclude certain individual in or from the study respectivity.

second :clinical history and examination of the test group and control were done by the physicians to help in exclusion or inclusion of the study subject.

3.8 Sample collection and processing

under antiseptic condition a venous blood sample(3ml) was collected from each participant then put in plain container to measure TSH, TT4,TT3. Serum was obtained by centrifugation at 3000rpm for 5 min ,then serum was collected and stored in eppendorf tube at 20c till used.

3.2Methods:

3.2.1Estimation of serum TSH:

3.2.1.1 principle:

The essential reagents required for an immunoenzymometric assay include high affinity and specificity antibodies (enzyme conjugated and immobilized), with different and distinct epitope recognition .in excess and native antigen .in this procedure the immobilization take place during the assay at the surface of micro plate well through the interaction of streptavidin coated in the well and exogenously added biotinylated monoclonal anti tsh antibody. Upon mixing monoclonal biotinylated antibody. The enzyme label antibody and a serum containing the native antigen reaction results between the native antigen and the antibodies. Without competition to form a soluble sandwich complex (hopton et al., 1986).

3.2.1.2 procedure

Brief according to manufacture ,all reagent and sample were allow to reach roomtemperture .the desired number of microtiter wells were secured in to frame holder and Format the micro plates wells for each serum reference .controls and patient specimen to be assay in duplicated.Pipette andPipette .050ml of appropriate serum reference, control or specimen in to assign well then Add 0.100ml of tsh enzyme reagent to each well.Swirl the micro plate gently for 30 sec to mix and

cover. incubate 60 min at room temperature. Discard the content of the micro plate by decantation, tap and blot the plate dry with absorbent paper. Add 300µl of wash buffer, decant repeat 2 additional time. Add 0.100ml of substrate solution to all well and incubate at room temperature for 15 min. Add 0.050ml of stop solution to each well and mix gently for 15-20 sec. Read absorbance in each well at 450 nm, the result should be read within 30 min of adding the stop solution. Results were calculated from blotting standard.

3.2.2 Estimation serum TT4

3.2.2.1 Principle;

The essential reagent required for a solid phase enzyme immunoassay include immobilized antibody, enzyme antigen conjugate and native antigen. Upon mixing immobilized antibody, enzyme-antigen conjugate and serum containing the native antigen a competition reaction results between the native antigen and the enzyme antigen conjugate for a limited number of immobilized binding sites (Barker., 1948).

3.2.2.2 Procedure;

Briefly according to manufacture, all reagent and sample were allowed to reach room temperature. The desired number of microtiter wells were secured in to frame holder and format the micro plates wells for each serum reference, controls and patient specimen to be assayed in duplicate. Pipette 0.025ml of appropriate serum reference, control or specimen into assigned well. Add 0.100ml of t4 enzyme conjugate solution to each well. Swirl the microplate gently for 20-30 sec to mix and cover. incubate 60 min at room temperature. discard the content of the microplate by decantation, tap and blot the plate dry with absorbent paper add 300µl of wash buffer, decant repeat 2 additional time. add 0.100ml of substrate solution to all well. incubate at room temperature for 15 min. add 0.050ml

of stop solution to each well and mix gently for 15-20 sec.read absorbance in each well at 450 nm ,the result should be read with in 30 min of adding the stop solution. Result were calculate from blotting standard.

3.2.3 Estimation of serum TT3

3.2.3.1 Principle

The essential reagent require for asolid phase enzyme immunoassay include immobilized antibody ,enzyme antigen conjugate and native antigen .upon mixing immobilized antibody ,enzyme –antigen conjugate and serum containing the native antigen acompetition reaction result between the native antigen and the enzyme antigen conjugate for alimit number of insolublized biniding sites(Gharib et al., 1971).

3.2.3.2 Procedure

Brief according to manufacture ,all reagent and sample were allow to reach roomtemperture .the desired number of microtiter wells were securd in to frame holder and formate the microplates wells for each serum reference .controls and patient specimen to be assay in duplicated .pipette .050ml of appropriate serum reference ,control or specimen in to assinged well.add 0.100ml of T3 enzyme conjugate solution to each well.swirl the microplate gently for 20-30 sec to mix and cover .incubate 60 min at room temperature.discard the content of the microplate by decantation, tap and blot the plate dry with absorbent paper add 300micro\l of wash buffer ,decant repeat 2 additional time .add 0.100ml of substrate solution to all well.incubate at room temperature for 15 min .add 0.050ml of stop solution to each well and mix gently for 15-20 sec.read absorbance in each well at 450 nm ,the result should be read with in 30 min of adding the stop solution Result were calculate from blotting standard.

3.3 Quality control

The precision and accuracy of all methods used in this study were checked by controls at levels in the low, normal and high rang for monitoring assay performance.

3.4 Statistical analysis:

Data obtained from this study was analyzed using statistical package for the social science (SPSS version 16), T test and person correlate were used for comparison and correlation. statistical significant was accept at p.value <0.05.

4. Result

This is an analytical cross-sectional, hospital based study, which was carried out during the period from February to May 2017 in Elsir abu Alhassan Center for Infertility in Khartoum state. The current study included 50 patients who were newly diagnosed as polycystic ovary syndrome and 50 apparently healthy Sudanese women matched in the two group study as in tables and figures.

Table (4.1) comparison between means of (TSH, TT4, TT3) (BMI) among Sudanese patients with PCO and control group TSH (mean±sd 2.37±1.68 nmol/ml versus 2.09±0.88 nmol/ml p.value 0.2) TT4 (mean ±sd 95.9±34.0 nmol/ml versus 95.3 ±22.0 nmol/ml p.value 0.9) TT3 (mean±sd 1.69±0.70 nmol/ml versus 1.56±0.74 nmol/ml p.value 0.3) BMI (mean±SD 29.26±7.30 kg/m² versus 27.82±5.32 kg/m²) and mean of age was (26.58±4.59 versus 26.42±4.58).

Table (4.2) comparison between means of TSH/T4/T3/BMI among Sudanese patient with PCO (bilateral and unilateral) TSH (mean±sd 2.36±1.7 nmol/ml versus 2.41±1.5 nmol/ml p.value 0.948) TT4 (mean ±sd 94.19±34.8 nmol/ml versus 101.3 ±31.2 nmol/ml p.value 0.590) TT3 (mean±sd 1.73±0.71 nmol/ml versus 1.48±0.62 nmol/ml p.value 0.363) BMI (mean±sd 30.1±7.3 versus 24.6±5.6 p.value =0.04).

Table (4.3) comparison between means of TSH/T4/T3/BMI among Sudanese patient with PCO (irregular cycle and regular) TSH (mean±sd 2.47±1.8 nmol/ml versus 2.12±1.3 nmol/ml p.value 0.522) TT4 (mean ±sd 95.50±37.2 nmol/ml versus 94.93 ±25.1 nmol/ml p.value 0.958) TT3 (mean±sd 1.71±0.72 nmol/ml versus 1.6±0.65 nmol/ml p.value 0.708) BMI (mean ±sd 30.7±7.6 versus 25.5±4.6 p.value=0.02).

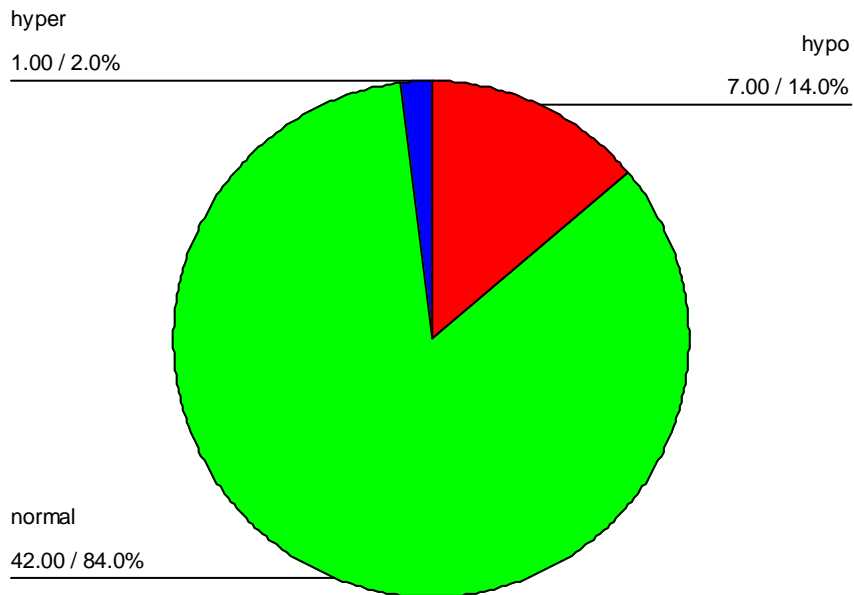
Table(4.4) shows association between PCO patients with (bilateral and irrreg cycle = 66% and bilateral reg cycle =18%)and (unilateral irreg =6%and unilateral reg cycle=10% p.value=0.018)

figer (4.1) shwos frequency of thyroid disease (hypothrodism=14% and hyperthrodism =2%) among PCO patient

Figer(4.2) Show correlation btween the level of TSH and BMI in PCO patients (r=0.316p.value=0.026)significant weak positve correlation.

Figer(4.3) Show correlation btween the level of TT4 and BMI in PCO patients (r= - 0.169 p.value=0.240) insignificant weak negative correlation.

Figer(4.4) Show correlation btween the level of TT3 and BMI in PCO patients (r= - 0.155 p.value=0.281) insignificant weak negative correlation.



-Figer (4.1)

Iullstrate the frequency of thyroid disease (hypothyrodism /hyperthyrodism)among women with polycystic ovary syndrome.

Table(4.1)compression between means of serum TSH/TT4/TT3 and BMI among Sudanese patients with poly cystic ovary syndrom and control group .

Varible	Mean \pm Sd	P.Value
TSH μ IU/L Case Control	2.37 \pm 1.68 2.09 \pm 0.88	0.2
TT4 nmol/L Case Control	95.3 \pm 34.0 95.0 \pm 22.0	0.9
TT3nmol/L Case Control	1.69 \pm 0.70 1.56 \pm 0.74	0.3
BMI Kg/m2 Case Control	29.26 \pm 7.30 27.82 \pm 5.32	0.2

-Result express as(mean \pm sd) and significant differences considered p. value \leq 0.05.

Table(4.2) shows comparison between means of thyroid hormones level (TSH.TT4.TT3) (BMI)and PCO (bilateral –unilateral) among Sudanese pts with PCO

Variable		Mean \pm SD	P.Value
TSH μ IU/L	Bilateral PCO	2.36 \pm 1.7	0.948
	Unilateral PCO	2.41 \pm 1.50	
TT4 nmol/l	Bilateral PCO	94.19 \pm 34.8	0.590
	Unilateral PCO	101.38 \pm 31.2	
TT3 nmol/l	Bilateral PCO	1.73 \pm 0.71	0.362
	Unilateral PCO	1.48 \pm 0.62	
BMI Kg/m ²	Bilateral PCO	30.1 \pm 7.3	0.04
	Unilateral PCO	24.6 \pm 5.6	

-Result express as(mean \pm sd) and significant differences considered p. value \leq 0.05.

Table (4.3) shows comparison between means of thyroid hormones (TSH.TT4.TT3) (BMI) and menstrual cycle (regular-irregular) among patients with PCO .

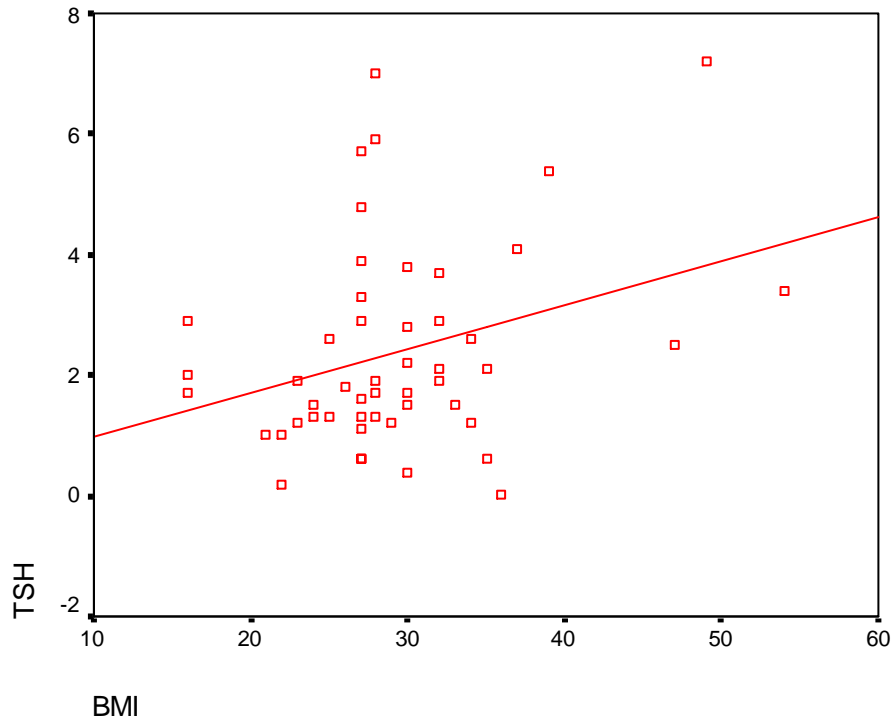
Mensteral cycle	Mean \pm Sd	P.Value
TSH Irregular μ IU/L Regular	2.47 \pm 1.8 2.12 \pm 1.3	0.522
TT4 Irregular nmol/lRegular	95.50 \pm 37.2 94.93 \pm 25.1	0.958
TT3 Irregular nmol/lRegular	1.71 \pm 0.72 1.6 \pm 0.65	0.708
BMI Irregular Kg/m2 Regular	30.7 \pm 7.6 25.5 \pm 4.6	0.02

-Result express as(mean \pm sd) and significant differences considered p. value \leq 0.05.

Table (4.4) illustrates cross-tabulation between polycystic ovary syndrome (bilateral \ unilateral) and menstrual cycle among pts with pco

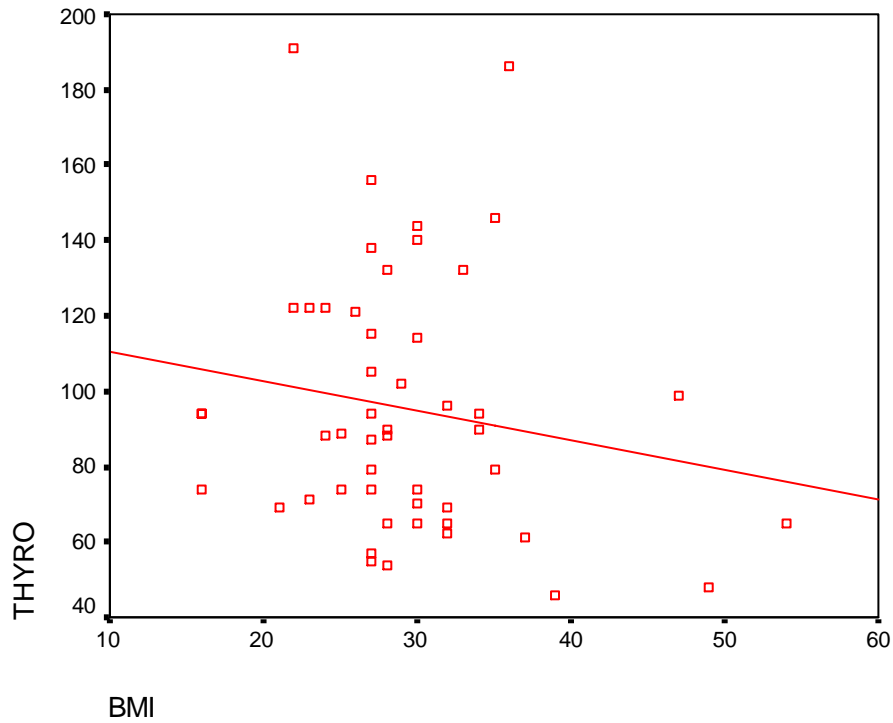
	M.CYCLE		P. Value
	Irregular	Regular	
Bilateral pco	66% (n=33)	18% (n=9)	0.018*
Unilateral pco	6% (n=3)	10% (n=5)	
Total	72% (n=36)	28% (n=14)	

-Result expressed as (mean \pm sd) and significant differences considered p. value ≤ 0.05 .



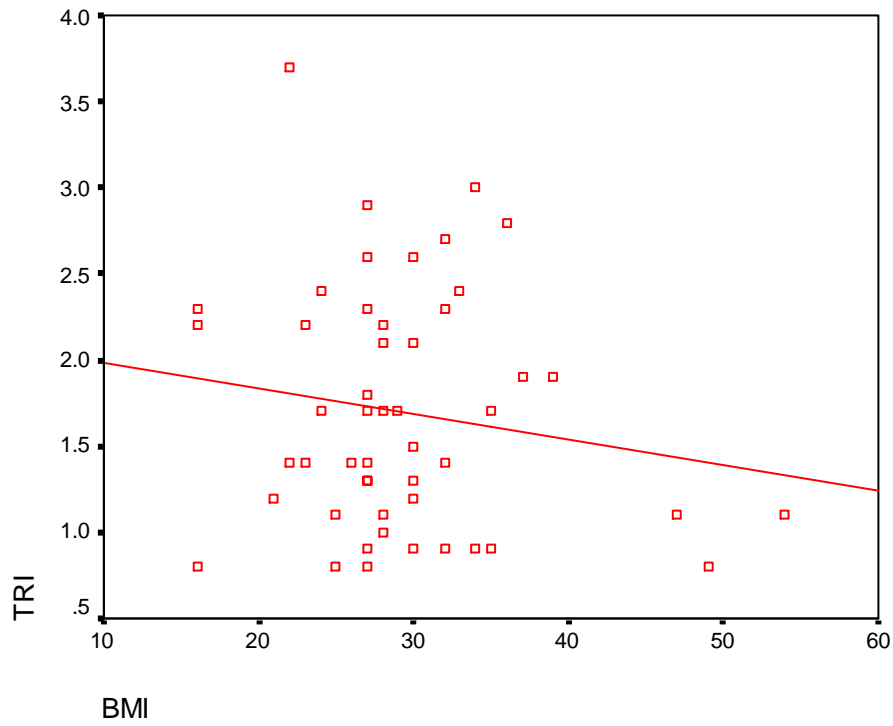
-Figer (4.2)

Shows Correlation between BMI and serum TSH level in case group.weak positive significant correlation ($r=0.316$ p.value =0.026)



--Figer(4.3)

Shows Correlation between BMI and serum TT4 level in case group. weak negative insignificant correlation ($r = -0.169$ p.value =0.240)



-Figer (4.4)

Shows Correlation between BMI and serum TT3 level in case group. weak negative insignificant correlation ($r = -0.155$ $p.value = 0.281$)

5- Discussion, Conclusion, Recommendations

5.1 Disussion

Thyroid disease and polycystic ovary syndrome are the two most common endocrine disorder in general population .althuogh the etiopathogeesis of thyroid disease and PCOS is completely different ,this two entities have many feature in common.This study was carried out to evaluate the thyroid hormones (TSH,TT4,TT3) among Sudanese women with poly cystic ovary syndrome in Khartoum state .

The current study showed there was insignificant variation of thyroid hormones (TSH,TT4,TT3) in PCOS patients compared to control group and this finding agree with result carried by (benetti et al.,2013) .Alsothe study show that there are frequency of thyroid diseases among polycystic ovary syndrome group was 14% hypothyrodism and this result agree with another result carried by(shirsath et al., 2015) which show that TSH level were significant increased,the ocurance of increase level of serum TSH in PCO women due to primary hypothyrodism rise thyrotrophin realizing hormone lead to increase prolactin and thyroid stimulating hormone prolactin contributes toward poly cystic ovary morphology by inhibiting ovalution as result of the chang of FSH,LH and increase dehydroepiandrosterone from the adrenal gland. The most obvius conection perhaps is increaseBMI and insulin resistant common to both condition (sinha et al., 2013).

The result showed there were weak significant positivecorrelation between BMI and the parameter TSH ($r = 0.316$ p .value =0.026),and also the study show there were significant increase in BMI with mensteral cycle (regular –irregular) p .value =0.02 and BMI significant increase with pco bilateral and unilateral p . value =0.04 and this result agree with another result carried by (Ganie et al., 2010).

The study show that there was association between PCO bilateral and unilateral with mensterl cycle regular ,irregular p.value 0.018 this result agree (Muderris et al., 2011).The study showed that there was insignificant varition on thyroid hormone in PCO patient with mensterl cycle (regular,irregular) p. value TSH=0.522 TT4=0.958 TT3=0.708 and The study showed that there was in significant varition on thyroid hormone in PCO patient with bilateral and unilateral p. value TSH=0.948 TT4=0.590 TT3=0.362this result agree with another result carried (benetti et al.,2013).Also the resultshowed that there was insignificant variation of parameter TSH . TT4,TT3 on age of PCO patient this result agree with another result carried by(sinha et al.,2013).

5.2 Conclusion

The study concludes that there was insignificant association between serum TSH,TT4 and TT3 and polycystic overy syndrome ,where as association observed btween PCOS with BMI also between BMI and mensteral cycle .The frequency of the thyroid disease was 14% hypothyrodism and 2% hyperthyroidism among PCO patients.

5.3 recommendations

From the finding of this study it is recommended that

- 1\ Moniter of thyroid hormones (TSH,TT4,TT3) should be estimated regulary among polycystic overy syndrome patients to prevent risk of thyroid disease .
- 2\Estimate of free thyroid hormone (FT4,FT3) instead of total thyroid hormones , thyroid autoantibodies thyroglobulin antibody (TgAb) ,antithyroperoxidase Ab (AntiTpo-Ab) and prolactin.
- 3\Women should have healthy life style to avoid complication of polycystic overy syndrome by minimize BMI and impair insulin response.
- 4\more study should be carried out on the affect of PCOS on thyroid hormones (TSH,TT4.TT3) with large sample size and to cover area with high population .

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Sudan University of Science and Technology

College of Graduate Studies

**Assesment of Thyroid Hormones level Among Sudanese
Women With Polycystic Overy Syndrome**

(Astudy in Khartoum state)

Questionnaire form

General Information:

Name:

No:

Sex: female

male

Age:

mobile no:

BMI Kg/m2: weight Kg

height Cm

Clinical information:

Mensrtual cycle: regular

irregular

Poly cystic overy syndrome : bilateral

unilateral

Investigation:

TSH μ IU/L

TT3 nmol/L

TT4 nmol/L

Table of serum TSH standard and quality control

No of standard	optical Density	Concentration
STD 1	0.025	0
STD 2	0.111	0.5
STD 3	0.3	2.5
STD 4	0.55	5
STD 5	0.9	10
STD 6	2.093	20
STD 7	2.415	40
QC 1	0.252	0.6
QC 2	2.337	33

Table of serum TT4 standard and quality control

No of standard	optical Density	Concentration
STD 1	0.184	0
STD 2	0.151	26
STD 3	0.131	65
STD 4	0.11	130
STD 5	0.098	195
STD 6	0.045	325
QC 1	0.183	38
QC 2	0.115	315

Table of serum TT3 standard and quality control

No of standard	optical Density	Concentration
STD 1	2.04	0
STD 2	1.549	0.5
STD 3	1.037	1
STD 4	0.509	2.5
STD 5	0.351	5
STD 6	0.319	7.5
QC 1	1.617	0.44
QC 2	0.267	6.6

