Polycystic Ovary Syndrome – A Review

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Abstract

Polycystic ovary syndrome is an endocrine hormone disorder affecting woman in the reproductive age of 18-50. It is the leading cause of fertility issues and other serious and life- threatening diseases amongst women. The main cause for PCOS is not known but genetics of family, environmental factors and most importantly lifestyle habits are considered as the reason for PCOS in women. The signs and symptoms of PCOS may vary from person to person but it is not necessary that every PCOS can be detected. The symptoms may be irregular menstrual cycle, pelvic pain, hirsutism, skin patches, acne etc. Unfortunately the market does not have any rapid, accurate and effective diagnostic method or drug for the cure of PCOS, but medication for the treatment of different signs and symptoms is available. With the advent of technology, novel methods, awareness amongst the masses and government initiatives, the market for PCOS has a huge prospect and potential for growth in the near future.

Keywords: Polycystic ovary syndrome; cysts; follicles; ovaries; menstrual cycle

Introduction

Polycystic ovary syndrome or PCOS is a very common and complex problem among women of reproductive age. The U.S. Department of Health and Human Services estimated that between 1 in 10 and 1 in 20 women of childbearing age suffers from PCOS. About 5 million women in United States suffer from PCOS and approximately 70% of these cases remain undiagnosed [1].

Polycystic Ovary Syndrome is also known Stein-Leventhal syndrome. It is a very common endocrine hormone disorder. According to experts, PCOS is ovulatory dysfunction with clinical evidence of hyper-androgenism in the absence of adrenal and thyroid diseases. Women with PCOS have enlarged ovaries that contain small collections of fluid filled follicles also known as cysts on the ovary and do not form sufficient amount of hormone to initiate ovulation.

The ovaries contain many harmless follicles that are up to 8mm in size. These follicles are under-developed sacs in which eggs develop. In women with PCOS, these sacs are often unable to release an egg, i.e., ovulation doesn't take place [2].

Women with PCOS face a lot of problem with their menstrual cycle and fertility. In a normal woman the ovaries have fluid filled sacs where the eggs are produced. As the egg grows, the cysts build up fluid. When the egg matures the cyst breaks and the egg is released. The egg finally travels through the fallopian tube to the uterus for fertilization. This process is known as ovulation.

Women having Polycystic Ovary Syndrome face a lot hormonal problem due to which ovulation does not occur. In PCOS the ovary is not able to produce all the hormones which are required for an egg to mature fully. With time the cysts or follicles might grow but ovulation does not occur and as a result progesterone hormone is not synthesized. Since progesterone is not made the menstrual cycle becomes irregular or is absent. Along with absence of progesterone, the ovaries also produce male hormones which further inhibit ovulation.

Cause

The main cause of Polycystic Ovary Syndrome is unknown. Experts believe that there are several factors which affects this ovulatory cycle. The main reason for PCOS is hormonal imbalance. In PCOS patients, the ovaries produce excessive androgens (male hormone) than normal. High levels of these hormones affect the development and release of egg during ovulation.

Resistance to insulin is also linked as a cause for PCOS. Insulin is a hormone which is produced by pancreas. It controls the amount of sugar in the body by converting starch and other food into energy for the body to use and store. When the body is resistant to insulin, it produces extra insulin to compensate for its effects. This high level of insulin in the body causes the ovaries to produce excessive testosterone or androgens, which as a result interferes with the development of follicles. High level of male hormones further interferes and prevents ovulation to occur. Researchers also believe that genetics also play a role in PCOS [3-8].

Symptoms

The symptoms of PCOS vary from woman to woman. The common sign and symptoms of PCOS are, pelvic pain: women suffering from PCOS experience acute pelvic pain due to irregular menstrual cycle, acne, oily skin, dandruff, weight gain and inability to lose weight easily, thinning of hair, irregular or absent menstrual cycle, sleep apnea, infertility and patches on the skin.

Women with PCOS tend to have higher chances of serious health conditions and life threatening diseases. It was found that PCOS have more than 50% chances of having diabetes before the age of 40 and 4-7 times higher risk of having hear attacks. Endometrial cancer, anxiety, depression, high blood pressure, high LDL and low LDL are few other serious complications faced by PCOS patients [9-14].

Diagnosis

There is no one single test for Polycystic Ovary Syndrome. A thorough study of the medical history of the patient along with a number of physical and laboratory test determines the presence or absence of PCOS. It is not mandatory that a patient having cysts will have PCOS.

In 1990 according to NIH/NICHD a woman with irregular menstrual cycle, excess androgen and free of other disorder which might lead to menstrual irregularity and hyperaandrogenism, is suffering from PCOS.

In 2003 ESHRE/ASRM in Rotterdam described that PCOS will be present in any woman if two of the three criteria is fulfilled, i.e., irregular menstrual cycle, excess androgens or polycystic ovaries diagnosed by ultrasound.

Various questions related to weight, skin, hair, menstrual cycle, pregnancy, diet and lifestyle habits etc. determines about prevalence of PCOS. History of hormonal problems running in the family, including diabetes helps to determine symptoms of PCOS.

Pelvic ultrasound is another method to diagnose enlarged ovaries with small cysts. These are signs of PCOS but not necessarily. The number of follicles and ovary volume are important in the evaluation of PCOS. The criteria for PCOS put forth by Adams et al. is that the presence of ≥10 cysts measuring 2–8 mm around a dense core of stroma or scattered within an increased amount of stroma. Jonard et al. has put forward another criterion to determine PCOS: "increased ovarian area (>5.5cm2) or volume (>11 mL) and/or presence of ≥12 follicles measuring 2 to 9 mm in diameter (mean of both ovaries)".These criteria had a specificity of 99% and a sensitivity of 75% for the diagnosis of PCOS [15-20].

There are various lab tests which must be carried out to confirm polycystic ovary. These diagnoses may be carried out by either carrying out, human chorionic gonadotropin test to determine pregnancy or testosterone test to check its levels in PCOS patients. Testosterone values may be normal in PCOS ranging within 150ng/dL. Androgens at high levels interfere with ovulation and causes acne, thinning of hair and male –type hair growth on face and body.

Also prolactin plays an important role in lack of menstrual cycle or infertility. In a PCOS woman the levels of prolactin is 50% higher than a normal woman. Dehydroepiandrosterone-sulfate values may be slightly elevated in PCOS patient.

Recently a very practical approach has been put forward by Homburg. According to him any one of four symptoms of PCOS (menstrual disturbance, hirsutism, acne or anovulatory infertility) should lead to an ultrasound evaluation of the ovaries. If PCO are found, the diagnosis is confirmed. If the ovarian morphology is normal, then biochemical testing is undertaken. If elevated LH, and/or fasting glucose/insulin <4.5, and/or elevated testosterone or free androgen index in observed then diagnosis is confirmed. Such proposals are the first steps towards a much needed, simple, and unified set of diagnostic guidelines for the clinician [5].

Treatments

Unfortunately polycystic ovary syndrome can't be cured, but the symptoms can be managed. It is difficult to diagnose PCOS in women. A number of tests and study is required to determine PCOS. Most of the patients even go undetermined. PCOS women face varied range of symptoms or may even face one symptom hence the treatment ranges are varied.

The main treatment options can be:

Lifestyle changes

A healthy lifestyle is the first step towards prevention and treatment of PCOS. Many women suffering from PCOS are overweight or obese. A person with higher Body Mass Index (BMI) tends to suffer from various health problems. Eating healthy and exercising regularly to maintain a normal BMI is mandatory. Consumption of processed food and drinks with added sugar should be avoided. Fruits, vegetables, whole grain products should be added to diet. This will not only maintain the BMI but will also help to lower blood glucose level. The body will be able to utilize the insulin and normalize the level of hormones in the body. As a result menstrual cycle will occur regularly [21-26].

Medicines

A number of medications are available in the market to treat PCOS. These medicines treat different signs and symptoms of PCOS, for example contraceptive pills or progesterone tablets are recommended to induce regular periods. These pills also reduce the male hormone levels and clear acnes. Women diagnosed with PCOS have fertility problems in the long run. With proper treatment PCOS women can also conceive. A small course of tablets before each cycle for several cycles is usually prescribed. Clomifene, Letrozole or Tamoxifen is usually prescribed to women with PCOS since it helps in regular ovulation. Metformin is prescribed in case clomifene is unsuccessful. Metformin is used to lower the insulin and sugar levels, reduce body mass and improve cholesterol levels in PCOS.

Unwanted hair growth (hirsutism) and thinning of hair is another problem faced by PCOS patients. Combinations of oral contraceptive pills such as co-cyprindiol, Dianette, Marvelon and Yasmin are used for treatment. Other medicines which are prescribed are flutamide, cyproterone acetate and finasteride. Laser hair removal, hormonal treatments are other methods to prevent growth of excessive hair and hair loss [27-30].

Surgery

Women with PCOS can opt for surgical methods to increase the chances of ovulation. Laparoscopic ovarian drilling is a method in which a small cut is made above or below the naval and a long, thin microscope called laparoscope is inserted. The ovaries are then punctured and surgically treated with heat or laser to destroy the tissues that produces the male hormone. This method lowers the level of testosterone and luteinizing hormone and helps in ovulation.

PCOS MARKET

The Polycystic ovary syndrome market is highly dominated by generic and off-label drugs. Currently there is no approved PCOS drug available in the market. Those that are available in the market treat the symptoms of PCOS but not the complication directly.

North America is leading the market due to high prevalence and huge demand for diagnosis and treatment of PCOS. It is expected that within five years Asia will show high growth rates with India and China being the fastest emerging PCOS market in Asia- Pacific region. This is due to the large number of patients, leap in healthcare expenditures and awareness programs initiated by the government [31-36].

Recently the increase in PCOS, diabetes, obesity, genetic and hormonal diseases have hooked the interest of the government, resulting in huge funding for the growth of the global PCOS drug market. Researchers are working towards introducing novel drugs for the treatment of PCOS. Pharmaceutical and diagnostic companies are striving to develop effective and accurate diagnostic tests that could detect PCOS in the early stages.

Thus, there is a huge potential for new methods and drugs for the diagnosis and treatment of PCOS to bridge the gap in the market.

Recent research on PCOS:

Considering the importance of PCOS, the condition has become a challenge to the modern society [37-42]. Great many research in several frontiers related to PCOS is going on which includes theoretical and experimental approaches. Association with diabetes has been found for PCOS conditions [43-47]. Hormonal responses are very closely associated with

the onset and varying conditions of PCOS, such as FSH [11]. Therefore, community level survey in association to this specific condition and healthy women should be conducted regularly to investigate more conditional symptoms [12]. Similarly, several analysis have been conducted with relation to Serum Osteoprotegerin, lifestyle modification, bone morphogenic proteins, activity of various hormonal receptors, dietary supplements, genetic polymorphism and vitamin consumption and assimilation with relevance to PCOS [13-14]. Computational methodologies have been rapidly evolving and supporting all realms of biomedical sciences including core research in molecular sciences [15-16] as well as related to PCOS conditions [17-18].

Conclusion

Polycystic ovary syndrome is a serious endocrine hormone disorder which is majorly affecting women in today's generation. Stressful and the unhealthy lifestyle followed by the people is the root cause of PCOS along with genetic and environmental factors. Since effective drugs are yet not available in the market for the complexity itself, cure lies in prevention of PCOS and leading a healthy lifestyle. Government and youth today are highly aware about health and its related issues, and thus, are taking steps and initiatives to develop drugs which have high efficacy and accuracy.

Various diseases have always threatened human civilization; either it is infectious disease [48] or non-communicable health aspects including gynecological issues. Improvement in the treatment methodologies certain times provide some solutions which are associated with PCOS and its future consequences [49]. Sometimes, social and ethical considerations too get involved with the situation.

Therefore, PCOS should be considered as a serious health issue considering all these issues and effective measures should be taken from medical and social aspect depending on the situation.

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