

Evaluation of Cardiovascular Disease Risk in Women having Poly Cystic Ovarian Syndrome

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Abstract

PCOS, also known as Stein-Leventhal syndrome, is a common endocrine disease characterized by two of the following three characteristics: Once the associated endocrinological and gynecological diseases have been ruled out, oligo-ovulation or anovulation, ii) clinical and/or biochemical indications of hyperandrogenism, or iii) polycystic ovaries should be considered. Cardiovascular disease (CVD) risk factors are common in women with polycystic ovarian syndrome (PCOS). The Androgen Excess and Polycystic Ovary Syndrome (AE-PCOS) Society established a panel to offer evidence-based evaluations of research examining the PCOS-CVD risk connection and to produce CVD prevention recommendations. The main pathophysiological abnormality in polycystic ovarian syndrome is a source of much debate (PCOS). Chronic anovulation in conjunction with androgen excess, hyperinsulinemia, and changes in gonadotropin production are now widely accepted as symptoms of this disease in women. Polycystic ovarian syndrome (PCOS) is linked to obesity and low-grade inflammation, and it may raise the risk of cardiovascular disease (CVD). This study examines the assessment of cardiovascular disease risk in women with PCOS.

Keywords: Polycystic ovary syndrome; Cardiovascular disease risk.

Introduction

Polycystic ovary syndrome (PCOS), or Stein-Leventhal syndrome, is a common endocrine

disorder that affects 5-10% of reproductive-age women, and according to 2003 Rotterdam

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criteria, it is commonly defined by two of the following three features:

1. Oligo-ovulation- or anovulation,
2. clinical and/or biochemical signs of hyperandrogenism, or
3. polycystic ovaries, once related endocrinological and gynecological disorders have been excluded.

Women with PCOS exhibited lower HDL levels, higher LDL/HDL ratios, and greater triglyceride levels than normally menstrual women, according to Wild and colleagues in 1985. Slowinska-Srzednicka et al's work is more recent, and they have noted the significance of insulin in the lipid abnormalities that are often seen in hyperandrogenic women with PCOS [1]. "To evaluate the accuracy of the scientists' hypothesis, 22 eumenorrheic control individuals, categorized by weight, were compared to 27 women with PCOS (obese and nonobese)." The HDL₂ level in women with PCOS was substantially lower and the apoB level was greater. After controlling for age, BMI, and sex steroids, multiple regression analysis of PCOS patients showed that fasting insulin was a significant variable in explaining total triglyceride and apoA-1 levels. According to the research by Wild et al (1992), in which women with androgen excess were treated for three months with a gonadotropin-releasing hormone agonist that reduced ovarian estradiol and testosterone, hyperinsulinemia was involved in the lipid abnormalities associated with PCOS [2]. Despite the fact

that sex steroid suppression was performed, lipid profiles remained abnormal, and were associated with insulin resistance. Insulin was shown to be linked more with lipoprotein abnormalities than endogenous androgens or estrogens.

Obese women with PCOS are at risk of cardiovascular disease, whereas metabolic syndrome and type 2 diabetes put obese women at an increased risk of cardiovascular disease. Blood pressure, waist circumference, body mass index, and serum lipid/glucose levels should be checked for all women with PCOS, and oral glucose tolerance testing should be conducted in those who are obese, have a family history of type 2 diabetes, or are older than age 40. It is recommended that all PCOS patients have a mood disorder evaluation. To avoid the onset of primary cardiovascular disease, lifestyle management is advised, which targets low-density and non-high-density lipoprotein cholesterol and includes using insulin sensitizing and other medicines to address persistent dyslipidemia or other risk factors.

Cardiovascular Diseases

Cardiovascular illnesses, which claim 17.9 million lives each year, are the leading cause of mortality worldwide. Coronary heart disease, cerebrovascular illness, rheumatic heart disease, and other ailments all belong to the category of cardiovascular diseases. Of all fatalities

caused by cardiovascular disease, almost four out of five are caused by heart attacks and strokes, and over a third of these deaths occur prematurely in individuals under the age of 70. A magnificent organ like the heart is used in many creative ways. It is produced in a constant, regular

pace, with a beating period ranging from 60 to 100 times per minute. One hundred thousand times each day. The heart may sometimes go out of sync. When the heartbeat is irregular or abnormal, it will be diagnosed as an arrhythmia.

Diseases	DALYs per 100000 Population			Death per 100000 Population		
	Female	Male	Total	Female	Male	Total
Cerebrovascular disease	1240(1295)	1605(1838)	1420(1554)	75(79)	90(99)	82(88)
Ischemic heart disease	2053(1406)	3783(2577)	2917(1972)	112(85)	178(128)	144(106)
Hypertensive heart disease	270(215)	343(252)	306(233)	15(13)	18(14)	17(13)
Rheumatic heart disease	269(155)	300(148)	285(151)	10(5)	11(5)	10(5)
Atrial fibrillation and flutter	36(46)	49(65)	42(55)	1(2)	1(2)	1(2)
Cardiomyopathy and myocarditis	126(112)	266(221)	197(166)	5(4)	10(8)	8(6)
Peripheral vascular disease	8(14)	10(16)	9(15)	<1(1)	<1(1)	<1(1)
Aortic aneurysms	25(29)	44(70)	35(48)	1(2)	2(4)	2(3)
Others	196(239)	229(272)	210(254)	5(9)	10(12)	7(10)
Endocarditis	18(19)	18(27)	18(23)	1(1)	1(1)	1(1)
Total cardiovascular diseases	4241(3530)	6648(5486)	5438(4471)	225(200)	321(273)	272(235)

Table 1: Age Standardized Death and Disability Rates of CVD in India.

The risk of cardiovascular disease may be reduced by cutting down on cigarette use, reducing salt in the diet, eating more fruit and vegetables, getting regular exercise, and avoiding hazardous alcohol consumption. It is important to design health policies that promote healthy behavior and make healthy options more inexpensive and accessible.

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. They include:

Cerebrovascular disease: a disease of the blood vessels supplying the brain;

Coronary heart disease: a disease of the

blood vessels supplying the heart muscle;

Rheumatic heart disease: damage to the heart muscle and heart valves from rheumatic fever, caused by streptococcal bacteria;

Peripheral arterial disease: a disease of blood vessels supplying the arms and legs;

Deep vein thrombosis and pulmonary embolism: blood clots in the leg veins, which can dislodge and move to the heart and lungs.

Congenital heart disease: birth defects that affect the normal development and functioning of the heart caused by

malformations of the heart structure from birth. The typical acute occurrence in these cases is a blockage that stops blood from flowing to the heart or brain, and these events are primarily triggered by a buildup of lactic acid in the arteries. Fatty deposits build up within the blood arteries that feed the heart or brain, and are the most frequent cause. Blood clots and bleeding in the brain may lead to strokes [4].

Risk Factors in Cardiovascular diseases

Unhealthy food, physical inactivity, cigarette use, and hazardous use of alcohol are among the primary behavioral risk factors for heart disease and stroke. Behavioral risk factors such as elevated blood pressure, elevated blood glucose, elevated blood lipids, and being overweight and obese may be seen in people. Risk factors that may be identified at primary care facilities are referred to as intermediate chance factors and signal a heightened risk of heart attack, stroke, heart failure, and other problems. Preventing premature deaths by identifying individuals at risk of cardiovascular disease and ensuring they get adequate therapy is possible. All primary health care institutions must have access to noncommunicable disease medications and basic health technology in order to provide treatment and counselling to individuals in need.

In addition, there are a variety of factors that contribute to CVDs. These dynamics reflect the overarching societal transformations that are spurred by global integration, urbanization, and aging of the population [5]. Other risk factors for cardiovascular disease include poverty, stress, and genetic factors. Addressing hypertension, diabetes, and excessive cholesterol levels is important in order to help control cardiovascular risk and decrease the chances of a heart attack or stroke.

Because of the post-heart attack medicines, people recover more quickly. The doctor's instruction must be followed so as to avoid the second stroke. Medications should be taken on time.

Preventive Measures for CVD

People can take the following steps to prevent some of the conditions within CVD:

Get regular exercise

The American Heart Association (AHA) recommend doing 150 minutes of moderate-to-intense physical activity every week.

Manage body weight

The National Institute of Diabetes and Digestive and Kidney Disorders advise that if a person loses 5–10% of their body weight, they may reduce their risk of developing CVD.

Quit smoking

Smoking is a key risk factor for almost all forms of CVD. Although quitting can be difficult, taking steps to do so can drastically reduce its damaging effects on the heart.

Follow a heart-healthy diet

Eating foods that contain polyunsaturated fats and omega-3, such as oily fish, alongside fruits and vegetables can support heart health and reduce the risk of CVD. Reducing the intake of processed food, salt, saturated fat, and added sugar has a similar effect.

Polycystic Ovary Syndrome

PCOS is a diverse condition, with long-term effects that begin in childhood and last into adulthood. It is thought that the long-term health consequences of PCOS stem from metabolic abnormalities that occur with the condition. PCOS is a prevalent hormonal disease that mostly affects women of reproductive age. Infrequent or extended menstrual cycles or high androgen levels may be associated with PCOS in women. Several tiny accumulations of fluid (or follicles) form in the ovaries and fail to release eggs consistently. There is no medical test that can diagnose PCOS with 100% certainty. Medical history of the patient is checked including menstrual cycles and weight fluctuations. Excess hair growth, insulin resistance, and acne are all on the list of

common findings during a physical checkup.

Common PCOS symptoms

Heavy bleeding: The uterine lining builds up for a longer period of time, which results in heavier periods than normal.

Irregular periods: A lack of ovulation prevents the uterine lining from shedding every month. Some women with PCOS get fewer than eight periods a year or none at all.

Acne: Male hormones can make the skin oilier than usual and cause breakouts on areas like the face, chest, and upper back.

Hair growth: More than 70 percent of women with this condition grow hair on their face and body including on their back, belly, and chest. Excess hair growth is called hirsutism.

Male pattern baldness: Hair on the scalp gets thinner and may fall out.

Weight gain: Up to 80 percent of women with PCOS are overweight or have obesity

Headaches: Hormone changes can trigger headaches in some women.

Darkening of the skin: Dark patches of skin can form in body creases like those on the neck, in the groin, and under the breasts.

Diagnosis

Blood tests: Blood may be analyzed to measure hormone levels. This testing can exclude possible causes of menstrual abnormalities or androgen excess that mimics PCOS. Additional blood testing is done to measure glucose tolerance and fasting cholesterol and triglyceride levels.

An ultrasound: Ultrasound is done to diagnose the internal organs to check if there are any possible changes that can be a reason to PCOS.

A pelvic exam: Reproductive organs are inspected to check for masses, growths or other abnormalities.

Clinicians are still not quite sure what causes PCOS. It is believed that insulin resistance, genes, and increased levels of inflammation in the body all contribute to its development. The amount of inflammation is elevated in many women with PCOS [6]. In addition to that, overweight individuals are at increased risk for inflammation. It has been shown that increased inflammation is related to elevated androgen levels.

PCOS is a condition where the levels of reproductive hormones are imbalanced. There are many factors that may influence menstrual cycle and also effect the child birth. Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH), Estradiol, and Prolactin are the hormones that may affects the PCOS.

Progesterone: With PCOS, body may not have enough of this hormone. Women might miss periods for a long time or have trouble predicting their cycle.

Androgens: They're often called male hormones, but women have them too. Women with PCOS tend to have higher levels.

Insulin: This hormone manages the blood sugar. If a person has PCOS, then the body might not react to insulin the way it should.

Cardiovascular Disease Risk in Women having PCOS

The cardiometabolic dysfunction often seen in women with PCOS (such as hyperinsulinemia, dyslipidemia, hypertension, and obesity) is prevalent among PCOS patients. New research has all but shown that singleton pregnancies in women with PCOS are accompanied by a heightened risk of pregnancy-induced hypertension, gestational diabetes, and pre-eclampsia. An increasing incidence of type 2 diabetes is shown with advancing age for women.

It is widely thought that the risks for cardiovascular disease in later life are substantially raised considering that metabolic risk factors are present in many women with PCOS from a young age [7]. So yet, evidence produced has not proven conclusive. With PCOS, there is a wide range of risks, which means that the

cardiovascular profile for each woman may vary depending on PCOS

phenotypic, age, ethnicity, and body mass index (BMI).

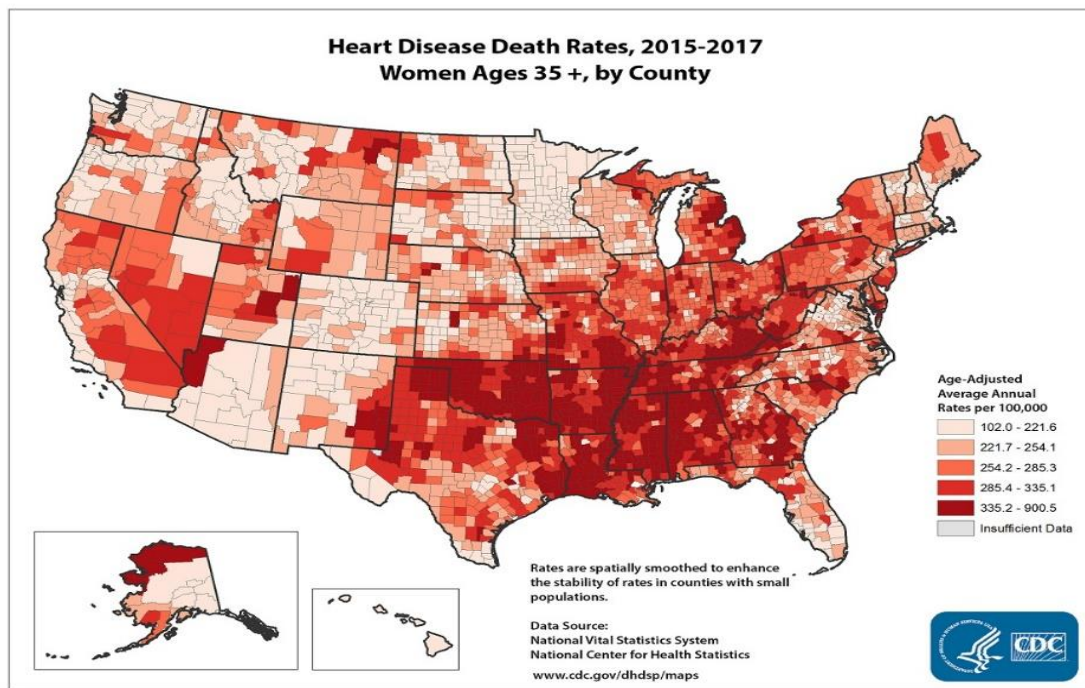


Figure 1: Heart diseases death rate.

In all women, the lifetime risk of cardiovascular disease (CVD) is substantial, and CVD may largely be prevented. Therefore, all women should be tested for CVD risk factors. Guidelines given by the American Heart Association (AHA) categorize women in terms of CVD risk, and classifying them into three groups is as follows: optimal risk, at risk, and at high risk. Although adolescents with PCOS tend to develop IR (90%) which precedes type 2 diabetes and cardiovascular disease, lifelong cardiovascular disease preventive measures are more effective for adolescents than older adults [8]. Thus,

all women with PCOS should be screened for cardiovascular disease risk.

A striking discovery is that the risk factors for PCOS present sooner in life than in non-PCOS women. This is very certainly caused by hormonal shifts that occur in early adulthood and by obesity, and it may also be related to where intra-abdominal fat is stored in individuals with PCOS. According to the research, however, data at this point are cross-sectional and cannot address questions like whether risk factors for PCOS vary over time, or how that varies between younger and older PCOS women. While it may be argued that PCOS represents one

of the finest instances of syndrome X as described by Reaven, it is questionable whether PCOS really does meet all the requirements for the condition. 19% of findings show that PCOS women likely experience an increased risk sooner in life than non-PCOS women. A unique set of risk factors of atherosclerosis and cardiovascular disease in women is detected in the PCOS cases, as evidenced by the elevated central obesity, hyperinsulinemia, and low HDL-C and high triglyceride levels noted in PCOS cases. Consequently, PCOS patients should be at a much higher risk of atherosclerosis compared to controls, especially at younger ages. People with PCOS have a greater incidence of atherosclerosis [9]. Estimation of the individual contributions of LDL-C to atherosclerosis risk in respect to several other risk factors may be obtained via an analysis of these risk factors relative contributions to atherosclerosis risk. In PCOS, women exhibit features similar to males and older postmenopausal women, whose risk factors include obesity and menopause. To establish if the clinical presenting features of PCOS women are linked to changes in risk factors or to the development of atherosclerosis, it will be necessary to follow up and evaluate the results [10-11].

Oligo- and polycystic ovarian syndrome (OCP) is often used to treat both hyperandrogenism and irregular periods in PCOS. OCP therapy raised the risk of

cardiovascular disease (CVD) in PCOS, although this only became non-significant when hypertension and dyslipidemia were not included as CVD outcomes. OCP is most likely not recommended for women with hypertension in general, but because the register-based methodology of the current research precludes any judgments on this matter, the simplest answer is that OCP is not given for women with hypertension. the usage of OCP is not adapted after the diagnosis of PCOS was made.

The study took baseline clinical and biochemical data into consideration while planning the research. PCOS is correlated with greater levels of inflammatory cytokines like IL-6 and other substances, which may be connected to an increased risk of cardiovascular disease.

There is evidence to suggest that PCOS metabolic risk is linked to the presence of an IL-6 gene polymorphism and that the risk may be reduced via lifestyle interventions and metformin therapy. Additional research is required on the long-term health impacts of PCOS and its lifestyle and pharmacological interventions on cardiovascular disease risk. Collecting more comprehensive measurements of baseline inflammatory markers for example, BMI and glycemic status are two ways potential enhancements to cohort studies like this might be implemented [12].

Conclusion

PCOS patients tend to have metabolic dysfunction owing to their unique hormonal pattern, marked by hyperandrogenism, insulin resistance, dyslipidemia, and an inflammatory state, they are at an increased risk of cardiovascular illnesses. With hypertension being the most prevalent cardiovascular diagnosis, the risk of developing cardiovascular disease (CVD) is substantially raised in PCOS. Research supports that the risk of developing cardiovascular disease must be addressed even in young, slim women with PCOS. A higher risk of cardiovascular disease is associated with the usage of OCP. Many PCOS women have a non-dipping pattern of blood pressure and elevated serum levels of homocysteine, a condition that isn't as well-known. "While PCOS may or may not be associated with arterial stiffness, the antero-posterior diameter of the abdominal aorta may still be an effective way to evaluate risk in individuals with this condition." There may be more to explore, namely diet- and medication-based therapies for metabolic problems in PCOS women, which may potentially improve their cardiovascular risk. While the cause of polycystic ovarian

syndrome (PCOS) is widely unknown, it is not the only hormonal disease that affects women. The main clinical signs of PCOS are acne, amenorrhea, or oligomenorrhea, along with hirsutism, infertility, and mental problems. CVD preventive measures in women with PCOS must be given great attention, but the effect of PCOS on future CVD should not be ignored. Insulin resistance is often one of the main causes of PCOS, which results in many cardiometabolic problems such as lipid abnormalities, hypertension, glucose intolerance, diabetes, and metabolic syndrome. This increases the risk of cardiovascular disease. PCOS is often accompanied by increase in other subclinical cardiovascular disease (CVD) indicators, such as coronary artery calcium scores, C-reactive protein, carotid intima-media thickness, and endothelial dysfunction. While it is widely known that PCOS is linked with cardiometabolic abnormalities, whether PCOS is independently associated with subclinical and clinical CVD, including its potential contribution to the development of CVD, is not completely apparent. People who maintain a healthy lifestyle and control their weight may reduce the risk of cardiovascular disease in the future.

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