

Polycystic Ovary Syndrome (PCOS):
An Under-recognized Cardiovascular Risk Factor in Women.

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Abstract

Cardiovascular disease (CVD) remains a silent killer of women. CVD kills more women than all forms of cancer. Women age 45 and older have less chance than men of the same age group of surviving a year after their first heart attack. Therefore, it is crucial that all women be screened well for the risk factors of CVD. Polycystic ovary syndrome (PCOS) is one of the many risk factors for CVD in women. Women with PCOS are at increased danger of developing CVD, as comorbidities of PCOS include insulin resistance, obesity, type 2 diabetes, hypertension, and dyslipidemia. In this review I present a summary of the current evidence that shows a significant relationship between PCOS and cardiovascular disease.

Keywords: PCOS, Polycystic ovary syndrome and cardiovascular disease, women and heart disease, CVD in women, PCOS and CVD.

Introduction

Polycystic ovary syndrome (PCOS) is a common but complex reproductive endocrine disorder. It affects 6% to 12 % of US women of reproductive age, as many as 5 million women (Centers for Disease Control and Prevention [CDC], 2018). According to Teede, Deeks, and Moran (2010), PCOS presents with diverse characteristics such as reproductive difficulties (infertility, hyperandrogenism, hirsutism, irregular periods), metabolic issues (insulin resistance, impaired glucose tolerance, type 2 diabetes mellitus, adverse cardiovascular risks), and adverse psychological features (increased anxiety, depression, and poor quality of life).

Women with PCOS are at increased risk for cardiovascular disease (CVD) and have greater insulin resistance, abdominal obesity, type 2 diabetes, dyslipidemia, and inflammation than those without PCOS (Meyer, Malek, Wild, Korytkowski, & Talbott, 2012). Women with PCOS most commonly present with obesity, which is present in two thirds of American women with PCOS. The degree to which obesity and PCOS combine to promote premature atherosclerosis and increase cardiovascular mortality is a worldwide issue (Wild et al., 2010). In 2016, CVD cost America \$555 billion, and the cost is estimated to rise to \$1.1 trillion by 2035 (American Heart Association, 2017). In addition to reducing the number of deaths, identifying the increased risk of CVD in women with PCOS will result in significant cost savings, as early detection is the key to prevention of the disease.

Wild et al. (2010) cited a number of studies that linked PCOS and CVD. One, a Women's Ischemia Evaluation Study, found that women with PCOS have a significant number of cardiovascular events. Another study found that hirsutism and increased waist/hip ratio were related to confirmed coronary artery disease (CAD) in women age 60 years or older undergoing coronary angiography. Women with PCOS have been found to have more advanced CAD than

women without PCOS. The researchers also noted that studies show that mood disturbances and depression, which are CVD risk factors, are traditional symptoms of PCOS.

Gourgari et al. (2015) found that adolescent and young women with PCOS have an atherogenic lipoprotein profile that puts them at a higher risk for CVD. The researchers observed that the profile appears to be driven by degree of visceral adiposity and insulin resistance.

PCOS is a complex condition for clinicians to manage and a scientific challenge for researchers. The relationship of PCOS to CVD remains under-recognized. Currently, there are insufficient long-term studies in PCOS to appropriately address its CVD risk. There are studies that support the idea that PCOS poses an increased risk of CVD, but the findings are not universal or they are controversial. More systematic research is needed to demonstrate the higher risk of CVD in women with PCOS.

Toward that end, I conducted a systematic review of the literature to explore the relationship of PCOS to CVD that puts the women with this complex condition at increased risk for CVD. The review was guided by the research question: Are women with PCOS at increased risk of CVD? After conducting the review I developed a practice guideline based on current evidence to improve the care provided by the advanced practice registered nurse. Through my research, I am determined to improve primary practice by early identification of CVD risk in patients with PCOS.

Methodology

I conducted a literature search utilizing various databases and also with the assistance of a Saint Agnes Medical Center librarian. The databases searched for this review are as follows: PubMed, CINAHL, Google Scholar, and the Hiebert Library of Fresno Pacific University. PubMed and CINAHL were searched with the terms *polycystic ovary syndrome and*

cardiovascular disease, women with PCOS at increased risk for CVD, PCOS and CVD, and risk of CVD in PCOS. Mesh terms in PubMed found were *PCOS, the risk of and CVD.* Full-text articles were searched.

For the review I considered studies that evaluated the increased risk for CVD in women with PCOS. I developed inclusion and exclusion criteria for the review using the PICO framework: participants, interventions, comparators, and outcomes:

- Participants: Studies that included women of reproductive age but were not limited to obese participants
- Interventions: Studies that addressed the risk of CVD in women with PCOS
- Comparator: Studies comparing increased risk of CVD in women with PCOS and women without PCOS as a control group
- Outcomes: Studies that reported the association of increased CVD risk in women with PCOS

The literature search was not limited to research with participants of specific ages as long as the studies were of good quality. Articles were restricted to those in the English language. The selected studies were not restricted by setting. Meta-analyses, cohort studies, case-control studies, and systematic reviews were included. Case studies, guidelines, reviews, and editorial articles were excluded. Only quantitative studies were included to minimize bias and to obtain reliable results. The quality appraisal instrument called Critical Appraisal Skills Program (CASP) was used to critically determine the value of each selected study. A total of ten studies were reviewed. The results are presented below and summarized in Table 1 at the end of the Results section.

Results

De Groot, Dekkers, Romijn, Dieben, and Helmerhorst (2011) performed a systematic review and meta-analysis of five controlled observational studies published between 2000 and 2008. The results showed a two-fold (2.02) risk for coronary heart disease (CHD) in women with PCOS compared to women without PCOS. This risk increased by 55% in the studies that adjusted for body mass index (BMI). This finding suggests that high BMI is not the sole cause of increased CVD risk in women with PCOS.

Meyer et al. (2012) performed a systematic review of 8 studies and a meta-analysis for 19 articles. All the articles investigated carotid intima-media thickness (CIMT) among women with PCOS and without PCOS. The researchers found a mean difference in CIMT among women with PCOS compared with controls of 0.072mm for the highest quality studies, 0.084mm for good quality studies, 0.041 for fair-quality studies, and 0.045 for lower quality studies. The researchers concluded that women with PCOS are at greater risk of premature atherosclerosis.

Zhao et al. (2016) performed a meta-analysis of five case-control studies and five cohort studies. The researchers estimated the strength of the association between PCOS and CVD risk by calculating odds ratio with a 95% confidence interval. In a subgroup analysis by type of CVD, PCOS patients were found to have significantly increased risk of CHD but not a significantly increased the risk of myocardial infarction (MI).

Roe et al. (2014) performed a case-control study with 124 women with PCOS and 67 controls. The aim of the study was to evaluate lipoprotein profile, including lipid particle size and number and cholesterol efflux capacity, in women with PCOS to understand the relationship between CVD with PCOS. Lipid profiles of participants with PCOS showed higher triglyceride, but mean high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol

(LDL-C) levels were similar in both groups. The researchers also reported significantly lower levels of lipoprotein ApoA1 (Apolipoprotein), a major constituent of HDL-C, in participants with PCOS. HDL-C function was assessed using ex-vivo cholesterol efflux assay; a significant reduction in efflux assay was observed in women with PCOS. Nuclear magnetic resonance spectroscopy results showed an atherogenic lipid profile associated with PCOS comprised of high very low-density lipoprotein particle number and size and increased small, dense LDL independent of obesity. These results showed significant dyslipidemia associated with PCOS, a condition that can put this population at increased risk of CVD.

A case-control study by Shi et al. (2013) examined the prevalence of hypertension and associated CVD risk factors in women with PCOS. The study consisted of 3396 women with PCOS and 1891 controls. The results showed a 19.2% prevalence of hypertension in women with PCOS, significantly higher than the 11.9% in the controls. After matching BMI, the hypertensive PCOS group was found to have higher glucose, insulin, homeostatic model assessment, and lipid levels than the normotensive PCOS group; these differences were significant at the $p < 0.05$ level. This study demonstrated a correlation between blood pressure and cardiovascular risk factors in women with PCOS.

Velija-Asimi, Burekovic, Dujic, Bostandzic, and Semiz (2016) found a high risk of developing CVD in women with PCOS associated with prediabetes incidence. The researchers examined 148 women with PCOS without type 2 diabetes mellitus (T2DM) and CVD. At baseline, prediabetes was present in 18 (12%) PCOS cases, and it progressed to T2DM in 5 (3%) of the cases. Incident prediabetes was noted in 47 (32%) women at 3-year follow-up. Prediabetes was related to elevated BMI, high C-reactive protein, insulin resistance, and high

lipid accumulation product. The study was limited by an inability to evaluate vascular endothelial function in women with PCOS.

A 20-year retrospective cohort study of diabetes and cardiovascular events in women with PCOS was conducted by Mani et al. (2012). The researchers followed 2,301 PCOS patients (mean age = 29.6 years). Incidences of T2DM, MI, angina, heart failure, stroke, and cardiovascular deaths were, respectively, 3.6, 0.8, 1.0, 0.3, 0.0, and 0.4 per 1000 person. At the end of the follow-up, the prevalence of MI in the age groups 45-54, 55-64, and >65 years was 1.9%, 6.0 %, and 27.3%, respectively; the incidence of angina was 2.6 %, 6.0 %, and 27.3 %, respectively. This study showed a high incidence and age-group-specific prevalence of T2DM, MI, and angina in women with PCOS.

In another cohort study, Ozegowska and Pawelczyk (2015) found cardiometabolic risk in patients with PCOS. The study examined 169 PCOS patients and 110 healthy women at reproductive age. Cardiovascular risk was estimated per American Heart Association and Androgen Excess-PCOS Society criteria. The researchers found that the PCOS group had significantly higher BMI, waist circumference, and waist-to-hip ratio. Metabolic syndrome was present only in the PCOS group. Significantly higher fasting insulin levels were reported for the PCOS group. Abdominal obesity was also found to be very common in the PCOS group, with 44% of PCOS patients having a waist circumference >80 cm, whereas only 14.5% of participants in the control group had abdominal obesity. Abdominal obesity is known to be associated with increased risk of atherosclerosis and CVD mortality. The results of this study can be useful in primary practice for diagnosing at-risk patients.

In a cross-sectional study, Akdag et al. (2015) studied increased P-wave and QT dispersion as two markers in patients with PCOS. The study involved 82 patients with PCOS and

72 healthy controls. Baseline 12-lead EKG and transthoracic echocardiography measurements were evaluated. Results showed the PCOS group had significantly higher QT dispersion and P-wave dispersion than controls. This increase in P dispersion and QT dispersion established a positive correlation with serum estradiol and testosterone levels. Higher P dispersion and QT dispersion are risk factors for cardiovascular events such as atrial fibrillation, stroke, ventricular tachycardia, and sudden cardiac death. P dispersion and QT dispersion may be used to predict risk for CVD in PCOS patients.

A synthesis of the studies reviewed indicates the presence of a significant relationship between PCOS and CVD. This result suggests a positive answer to my research question: "Are women with PCOS at increased risk of CVD?" Meyer et al. (2012) reported PCOS women have a higher carotid artery intima-media thickness (CIMT) than women without PCOS, putting women with PCOS at increased risk of premature atherosclerosis. Velija-Asimi et al. (2016) showed that women with PCOS associated with prediabetes had a high risk of developing CVD. Sahin et al. (2014) found higher epicardial adipose tissue thickness (EATT) in obese PCOS patients compared with an obese control group. They demonstrated a positive relationship between EATT and age, BMI, waist circumference, fasting insulin, triglycerides, and high sensitive C-reactive protein. EATT is clinically associated with abdominal visceral adiposity, which has a significant impact on CVD risk (Sahin et al., 2014). De Groot et al. (2011) reported a 2-fold risk of arterial disease for PCOS women compared to women without PCOS.

Table 1

Selected Characteristics of Studies Reviewed

Author, Year Published, Country	Variables • DV • IV	Study Design	Sample Size and Characteristics	Results	Strength of Evidence
de Groot, Dekkers, Romijn, Dieben, & Helmerhorst, 2011, Netherlands	IV=PCOS DV=CHD	Systematic review and meta-analysis	5 controlled observational studies published between 2000 and 2008	Risk for CHD or stroke 2.02 comparing women with PCOS to women without PCOS. Studies adjusted for BMI showed a relative risk of 1.55.	Level 1
Meyer et al., 2012, USA	IV=PCOS DV=Atherosclerosis	Systematic review and meta-analysis	8 systematic reviews and 19 meta-analyses studies (total of 1123 women with PCOS women, 923 controls)	The summary mean difference in CIMT among women with PCOS compared with controls was 0.072mm for highest quality studies, 0.084mm for good quality studies, 0.041 for fair-quality studies and 0.045 for lower quality studies.	Level 1
Mani et al., 2012, UK	IV= PCOS DV= Diabetes, CVD	Cohort study	2301 patients with diagnosis of PCOS	Incidences of T2DM, MI, angina, heart failure, stroke, and CVD deaths were, respectively, 3.6, 0.8, 1.0, 0.3, 0.0, and 0.4 per 1000 person. Prevalence of MI in age groups 45-54, 55-64, and >65 yrs was 1.9%, 6.0 %, 27.3% and of angina 2.6%, 6.0% and 27.2%, respectively.	
Shi et al., 2013, China	IV= PCOS DV=Hypertension, CVD risk factors	Case-control study	PCOS=3396, controls=1891.	Prevalence of hypertension 19.2 % in women with PCOS, significantly higher than the 11.9% in the controls.	Level 5
Roe et al., 2014, Maryland	IV= PCOS DV= CVD	Case-control study	124 women with PCOS ages 18-50 years without any existing CVD, 67 controls	Lipid profile showed higher triglyceride levels in PCOS group, but mean HDL-C and LDL-C levels were similar in the two groups. Mean Apo1 levels were lower and the ApoB/ApoA1 ratio was higher in PCOS patients.	Level 5
Sahin et al., 2014, Turkey	IV=PCOS DV= CVD	Cohort Study	66 PCOS patients, 55 controls with normal androgen levels.	Mean EATT was 0.38 +/- 0.16 mm in PCOS group and 0.34 +/- 0.36 mm in the control group. Mean NGAL levels in PCOS were 101.98 +/- 21.53 pg/ml; mean NGAL levels were 107.40 +/- 26.44 pg/ml in the control group.	Level 4

Table 1, continued

Author, Year Published, Country	Variables • DV • IV	Study Design	Sample Size and Characteristics	Results	Strength of Evidence
Ozegowska & Pawelczyk, 2015, Poland	IV=PCOS DV=CVD	Cohort study	169 PCOS patients, 110 healthy women, all in reproductive age	In the PCOS group, 42.3% prevalence of high BMI and 15.45% obese; in control group, 11.8% prevalence of high BMI with no obese subjects. 44% of PCOS group and 14.5% of control group had waist circumference >80cm.	Level 4
Akdag et al., 2015, Turkey.	IV= PCOS DV= P-wave dispersion, QT dispersion	Cross-sectional study	82 PCOS patients, 74 matched-age healthy controls	PCOS group had significantly higher QT dispersion and P-wave dispersion.	Level 6
Velija-Asimi, Burekovic, Dujic, Bostandzic, and Semiz, 2016, Bosnia and Herzegovina.	IV= PCOS DV= prediabetes	Prospective, cohort study.	148 women with PCOS without T2DM and CVD.	At baseline, prediabetes was present in 18 (12%) of PCOS cases and it progressed to T2DM in 5(3%) of the cases. Incident prediabetes was noted in 47 (32%) women at 3-year followup.	Level 4
Zhao et al., 2016, China.	IV= PCOS DV= CVD	Meta-analysis	5 case-control, studies, 5 cohort studies; 104392 total participants	Case-control and prospective cohort studies showed significant results, retrospective cohort studies did not show positive results. PCOS patients had significantly increased risk of CHD but not of MI.	Level 1

Note. CHD = coronary heart disease; PCOS = Polycystic ovary syndrome; CVD = cardiovascular disease; CIMT = carotid intima-media thickness; EATT = epicardial adipose tissue thickness; NGAL = neutrophil gelatinase-associated lipocalin; T2DM = type 2 diabetes mellitus; MI = myocardial infraction.



PRISMA 2009 Flow Diagram

Identification

Articles identified through
database PubMed searching
(n = 136)

Additional records identified
through other sources(CINAHL)
(n = 82)

Screening

Records after duplicates removed
(n = 52)

Records screened
(n = 52)

Records excluded
(n = 20)

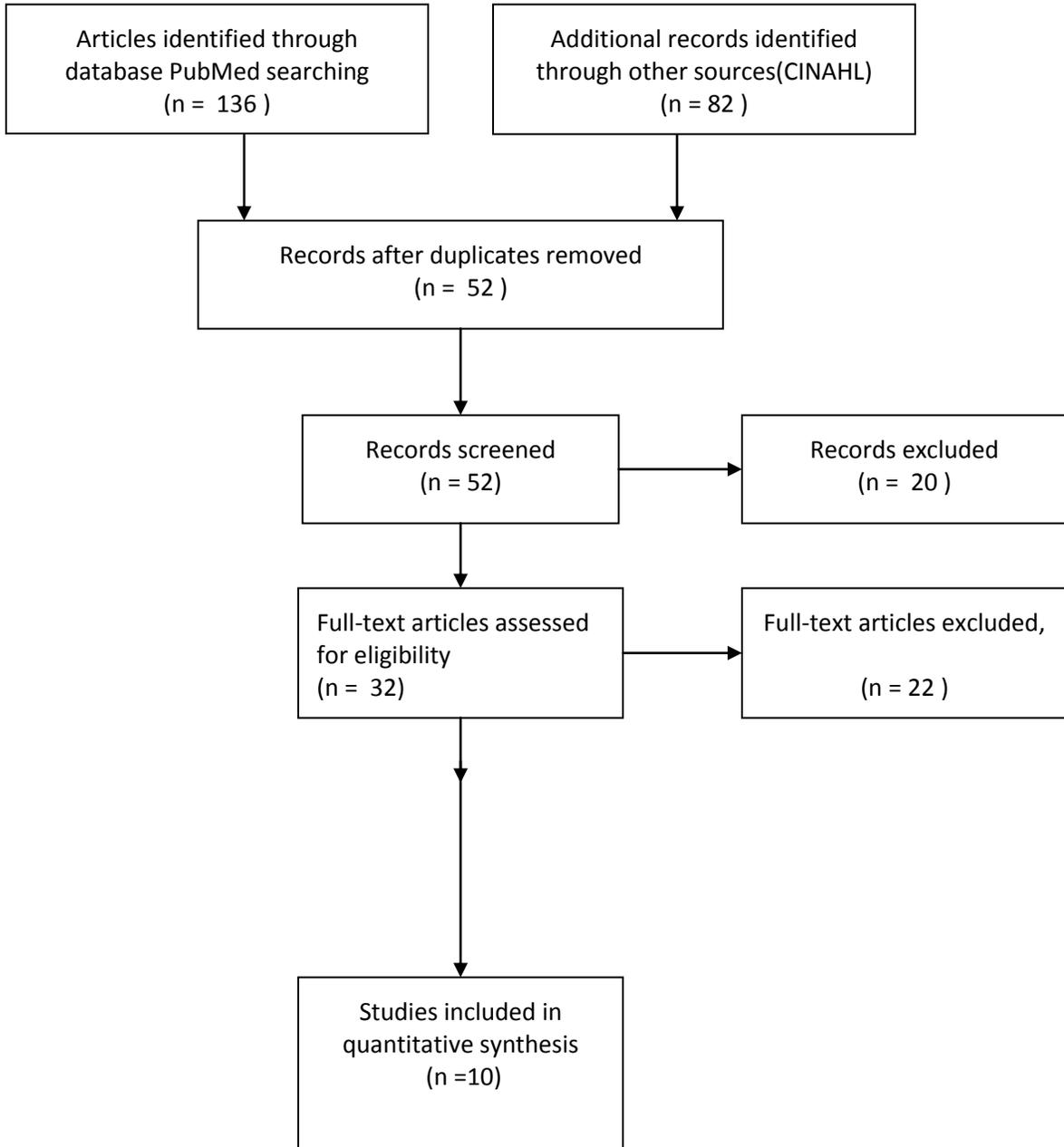
Eligibility

Full-text articles assessed
for eligibility
(n = 32)

Full-text articles excluded,
(n = 22)

Included

Studies included in
quantitative synthesis
(n =10)



Discussion

CVD is the leading cause of death in women globally. In the United States, more than one in three women dies from CVD; more women die from CVD than from all forms of cancer deaths (Sallam & Watson, 2013). Despite improvements in overall cardiovascular treatments and outcomes, substantial gender disparities remain (Sallam & Watson, 2013). The rate of decline in CVD is slower for women than for men, a fact that highlights the need for identification of gender-specific risk factors and interventions (Sallam & Watson, 2013). PCOS is one of the many gender-specific risk factors for CVD in women. Diagnosis for PCOS is based exclusively based on reproductive criteria (hyperandrogenism and oligo/anovulation), but the condition is also a metabolic disorder (Baldani, Skrgatic, & Ougouag, 2015). Type 2 diabetes, impaired glucose tolerance, obesity, and dyslipidemia are more prevalent in women with PCOS than women without PCOS. The metabolic disturbances in PCOS patients can lead to chronic inflammation and cardiovascular impairments that heighten the risk for CVD (Baldani et al., 2015).

Practice Guidelines for Reducing Risk of CVD in Women with PCOS

Based on the results of the studies reviewed and described above, I recommend the following practice guidelines be implemented to reduce the risk of CVD in patients with PCOS:

1. **Assess CVD risk factors.** Assessing CVD risk factors in women with PCOS is vital to preventing deadly CVD disease. Women with PCOS are at risk of developing CVD if they are obese, are hypertensive, smoke cigarettes, have dyslipidemia, have subclinical vascular disease, have impaired glucose tolerance (IGT), or have a family history of premature CVD.

Risk of CVD increases further if a woman with PCOS has metabolic syndrome, T2DM, or renal or vascular disease. The following components should be assessed closely in order to identify the risk of CVD at an early stage:

- Waist circumference and BMI should be checked at every visit. A waist circumference of at least 35 inches in Caucasian/African American women or at least 31.5 inches in Hispanic, Native American, Asian, and European women is the good way to establish the presence of abdominal obesity (Wild et al., 2010).
 - A complete lipid profile should be determined. If fasting serum lipid profile is normal, it should be assessed every 2 years, or sooner if the patient gains weight (Wild et al., 2010).
 - A 2-hour post 75g oral glucose test should be performed in women with PCOS with BMI more than 30 and in lean women with PCOS over 40 years of age with a history of gestational diabetes or family history of T2DM. This test is the best way to detect impaired glucose tolerance (IGT) or T2DM in women with PCOS with normal fasting glucose (Wild et al., 2010).
 - Blood pressure should be checked routinely at each visit to detect hypertension at an early stage. Prehypertension should be treated to reduce CVD risk (Wild et al., 2010).
 - Women with PCOS should be assessed for depression and anxiety on a regular basis because they are at risk of depression and anxiety due to low self-esteem related to body image concerns.
2. **Educate patients.** Lifestyle modifications should be taught to women with PCOS, including diet, exercise, smoking cessation, and behavioral modifications (Wild et al., 2010).

- Foods that are hypocaloric and low in saturated fat are recommended as well as increasing consumption of fiber, whole-grain breads, cereals, fruits, and vegetables.
- The need for 30 minutes of moderate-intensity physical activity daily should be reinforced. Together, proper diet and exercise can reduce BMI and improve insulin resistance and cardiovascular function in overweight women with PCOS (Wild et al., 2010). A cardiac stress test is recommended before initiating an exercise regimen if cardiac symptoms are present.
- Tools for assessing, treating, and monitoring depression and reduced life quality are necessary for behavioral management.

3. **Provide medical therapy:**

- **Insulin sensitizers:** Use of Metformin is suggested for women with PCOS who have tried lifestyle modifications and did not have improvement in IGT and in those with IGT who are of normal weight (Wild et al., 2010).
- **Cholesterol-lowering drugs:** Cholesterol-lowering medications should be prescribed if LDL-C levels remain above 130mg/dl despite 3 months of lifestyle modifications (Wild et al., 2010). Serum levels can be reevaluated 6 weeks after initiating medications. Although many lipid-lowering medications are available, only statins have been adequately studied in women with PCOS and shown to effectively lower LDL-C levels (Wild et al., 2010).
- **Antihypertensives:** Antihypertensives are indicated for blood pressure of 130/90 mm Hg or above. A combination of medical therapy and lifestyle modification is recommended for persistent hypertension in women with PCOS (Wild et al., 2010).

Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers are favored over diuretics and beta blockers (Wild et al., 2010).

- **Bariatric surgery:** Bariatric surgery may increase weight loss up to 60% and improve diabetes, hypertension, and dyslipidemia. Bariatric surgery can be an option for severely obese women with PCOS. However, the risks associated with bariatric surgery should be considered, such as the 0.1 -1.1% mortality rate, bowel obstruction, infection, and esophagitis. Bariatric surgery should be performed only after other weight-loss strategies have failed in women with PCOS women with BMI greater than 40 (Wild et al., 2010).

Conclusion

PCOS is a complex condition for healthcare providers to manage, and it is an under-recognized CVD risk factor for women. PCOS is still believed by many to be a gynecological problem only, but indeed it puts women at higher risk for heart disease. The purpose of this literature review was to explore the relationship between PCOS and CVD and to make this dilemma clearer. The objective of this study was to improve primary practice by demonstrating the importance of viewing PCOS as not just a gynecological problem, but also as one of the CVD risk factors in women. Another objective of this review was to reduce the incidence of heart disease in women through early identification of CVD in women with PCOS.

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Polycystic ovary syndrome (PCOS): An important under-recognized cardiovascular risk factor in women.

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Introduction

Cardiovascular disease (CVD) remains the silent killer in women. CVD kills more women than all forms of cancer (American Heart Association, 2013). So, it's crucial that all women should get screened well for the risk factors of CVD.

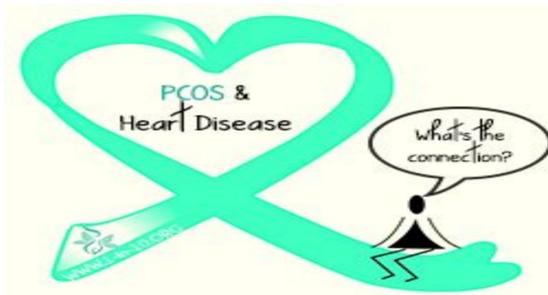
Polycystic ovary syndrome (PCOS) is one of the many risk factors for CVD in women. Women with PCOS are at increased risk of developing CVD, as comorbidities of PCOS include insulin resistance, obesity, Type 2 diabetes, hypertension, and dyslipidemia (Baer et al., 2015).

Methodology

A systematic review was chosen for this project, to minimize the bias and to achieve reliable findings. PRISMA (2009) guidelines were followed for this systematic review.

The inclusion and exclusion criteria for this review were developed using the framework of participants, interventions, comparators, outcomes, and setting (PICOS):

- **Participants:** Studies that includes the women with PCOS, but not limited to obese participants, are selected.
- **Interventions:** Studies that addressed the risk of CVD in women with PCOS are included.
- **Comparator:** Studies comparing increased risk of CVD in women with PCOS and women without PCOS as a control group are selected.
- **Outcomes:** Studies that reported the association of increased CVD risk in women with PCOS are included.
- **Setting:** The selected studies were not limited by settings (e.g. country). In this review, meta-analysis studies, cohort studies, case-control studies, and systematic reviews were included. Excluded studies were; case-studies, guidelines, reviews, and editorial articles. The review was not limited to five years, as long studies were high quality. The review was limited to studies that are published in the English language. Only quantitative studies were included to minimize bias and to obtain reliable results. A total of ten studies were reviewed.



Results

Women with PCOS found to have a two fold (2.02) risk for coronary heart disease (CHD) as compared to women without PCOS, This risk increased by 55% in the women with high BMI.

Women with PCOS found to have higher carotid intima-media thickness (CIMT), a marker of subclinical atherosclerosis. That puts women with PCOS at greater risk for premature atherosclerosis.

Another study explored lipid profiles of participants with PCOS which showed higher triglyceride levels. These results showed significant dyslipidemia associated with PCOS, a condition that can put this population at increased risk of CVD.

Women with PCOS also found to have higher prevalence of hypertension than the control group. Women with PCOS also found to have high incidences of Type2DM, MI, and angina than control group.

Women with PCOS found to have high risk of developing CVD associated with prediabetes incidence. Prediabetes was related to elevated BMI, high C-reactive protein, insulin resistance, and high lipid accumulation product.

Researchers also found, increased P-wave and QT dispersion as two markers in patients with PCOS. Higher P dispersion and QT dispersion are risk factors for cardiovascular events such as atrial fibrillation, stroke, ventricular tachycardia, and sudden cardiac death.

The PCOS group found to have significantly higher BMI, fasting glucose levels, waist circumference, and waist-to-hip ratio. Abdominal obesity is known to be associated with increased risk of atherosclerosis and CVD mortality.

Discussion

PCOS is such a complex condition to manage for clinicians and is a scientific challenge for the researchers. Relationship of PCOS to CVD remains under-recognized. PCOS is still believed by many to be a gynecological problem only, but indeed it puts women at higher risk for heart disease.

The purpose of this literature review was to explore the relationship between PCOS and CVD and to make this dilemma clearer. The objective of this study was to improve primary practice by demonstrating the importance of viewing PCOS as not just a gynecological problem, but also as one of the CVD risk factors in women. Another objective of this review was to reduce the incidence of heart disease in women through early identification of CVD in women with PCOS.



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