Review Article

Factors Related to Polycystic Ovary Syndrome Among Women in Asia Population: A Systematic Review

Astri Dwi Andini[1], Sylfia Mustika[1], Rashif Hizbullah Arsya[1], Ulfa Rahmi[1], Nabilla Mustafa[1], Risma Anjelina[1], Ricvan Dana Nindrea[2]

[1]Faculty of Medicine, Universitas Andalas, Padang City, Indonesia
[2]Department of Public Health and Community Medicine, Faculty of Medicine, Universitas Andalas, Padang City, Indonesia

Corresponding Author: Ricvan Dana Nindrea

ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is the most common endocrine disturbance that affects 5-20% in women of reproductive age, and its etiology remains unclear, but it is widely unknown for different subpopulations based on geographical location and race/ethnicity. This study aimed to review factors related to polycystic ovary syndrome (PCOS) among women in Asia Population.

Methods: This systematic review was conducted on published research articles on factor related to polycystic ovary syndrome among women in Asia population. Impact factor is one measure showing the average citation for articles published by a scientific journal published between 2014 and 2019 on the online article database of PubMed. The data collected is an English language article with the type of article in the form of an original article. The articles that have been collected will be tabulated according to the name of the author, the year the paper was published, the location of the study, and the number of research samples and research was only limited to humans. Data were analyzed with narrative synthesis.

Results: A total of 209 articles have been reviewed, 4 of which have been selected for systematic review. The results showed the risk factors of polycystic ovary syndrome among Asian women are: insulin resistance (Asian women were more likely to have diabetes compared with Caucasian); hyperandrogenemia (total testosterone, androstenedione, and FAI secretion were increased in women with PCOS); genetics (the VDR gene BsmI A/G ApaI A/C TaqI T/C in South Indian women, constitute an inheritable risk factor for PCOS); and obesity (body mass index, waist circumference, and body fat percentage facilitating the screening or diagnosis of PCOS).

Conclusion: From the analysis, we found that the risk factors of polycystic ovary syndrome among Asia women are insulin resistance, hyperandrogenemia, genetics, and obesity.

Keywords: Polycystic ovary syndrome, Asia, Insulin resistance, Hyperandrogenemia, Genetics, Obesity

INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder and metabolic disorder that affects 5-20% of women of reproductive age worldwide, but it is widely unknown for different subpopulations based on geographical location and race/ethnicity. [1] PCOS terms associated with combination of signs and symptoms of heterogeneous endocrine disorder such as hyperandrogenism, and ovulatory dysfunction (oligo-ovulation and/or polycystic ovarian morphology (PCOM)). [2] Patient with PCOS causes unwanted changes in the appearance of women (obesity, hirsutism, acne, and alopecia) and overtime can lead to serious health problem such as reproductive abnormalities, marked insulin resistance, increased risk for type 2 diabetes mellitus,

coronary heart disease, atherogenic dyslipidemia, cerebrovascular morbidity, anxiety and depression. [3]

The exact cause of PCOS is still unclear but it is thought to be multifactorial. Mostly due to hormonal imbalances that is elevated luteinizing hormone (LH) and normal or suppression of follicle stimulating hormone (FSH) resulting in altered LH/FSH ratio. Also the clinical features of hyperandrogenism are related hyperinsulinemia and insulin resistance. Some study was found genetic, obesity and environment factors also contribute for hyperinsulinemia that predisposing individuals for PCOS. Ethnicity is one of the keys to standardize the diagnosis and management of PCOS. It is because of genetic component play important roles in the pathogenesis of PCOS. This review outlines the risk factor associated about PCOS in Asia, with the aim of providing a few clear and simple principles for its proper diagnosis. [4]

MATERIALS & METHODS
Study design and research sample
This study is a systematic review that was conducted with the guidance of PRISMA (preferred reporting items for systematic reviews and Meta-Analysis). Systematic review was used to collecting articles that are relevant and related to factors related to PCOS in Asian female populations. The sample of this research procedure by collecting data from PubMed data base and reviewing the articles were published between 2010 to November 2019.

Operational definitions
The independent variables in this study are genetic, insulin resistance, hormonal, obesity and the dependent variable in this study is Polycystic Ovary Syndrome in the Asia female population.

Research procedure
This research procedure by collecting data from PubMed data base with keywords: risk factor OR menstrual cycle disorder OR menstrual disturbances OR physical activity OR emotional disturbances OR genetics OR metabolic syndrome OR body mass index OR obesity OR insulin resistance AND reproductive periods OR woman AND Asia AND Polycystic Ovary Syndrome. The article will be excluded if it meets the criteria: a) not PCOS; b) outside of the case control and cohort; c) data unavailability or inadequacy of research.

Data collection technique
Data collection is done through an online search. The data collected is an English language article with the type of article in the form of an original article. The articles were published between 2010 to November 2019. Research was only limited to humans. Potential titles will be reviewed, either only abstracts or full text. The articles that have been collected will be tabulated according to the name of the author, the year the paper was published, the location of the study, and the number of research samples. The inclusion criteria of this study sample were research on risk factor of PCOS that affect women in Asia. Exclusion criteria were: the research was not satisfied or if the provided information was insufficient for data extraction. The following data were obtained from each article: first author's name and year of publication, region, type of study and number of sample.

Data analysis
Data were analyzed using narrative synthesis by taking or linking research results in one article with other articles, then drawing conclusions thoroughly and providing recommendations at the end of synthesis.
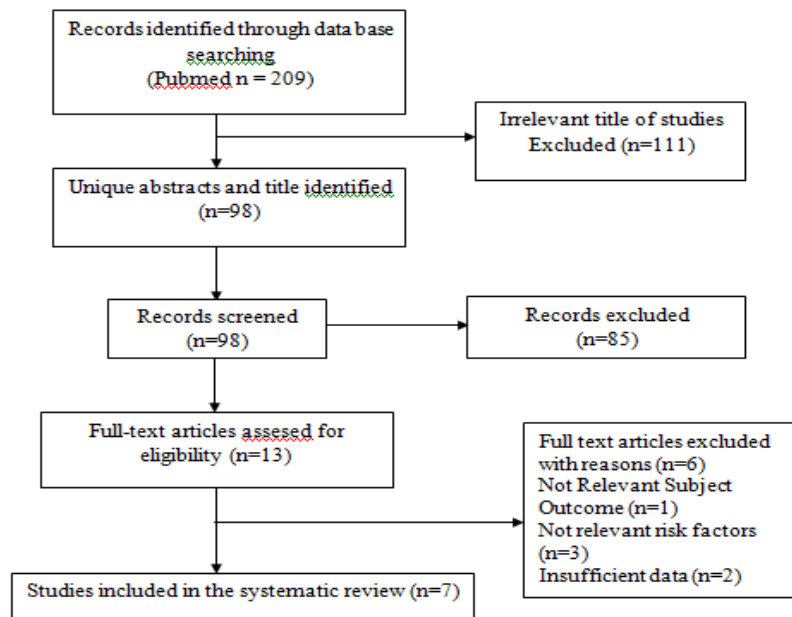
Figure 1: Prisma flow chart

RESULT

In this section, we used methods to classify selected articles by author, year, title, research methodology, and the results of research (Table 1).

Table 1 : Articles result of systematic review

No	Authors, year	Method	Outcome
1	Chen, et al., 2010 [5]	Cross-sectional study	The proportion of PCOS patients over 23 kg / m(2) with BMI was 34.63%.Measurements of serum insulin, triglycerides, waist and waist / hip (W / H) were all positively correlated with BMI in women with PCOS. In Chinese PCOS patients, the prevalence of metabolic syndrome was 18.9 percent. Review of the receiver-operating characteristics indicated that at BMI > or= 23 kg / m(2), the diagnostic power to detect metabolic disorders was at its best.
2	Mani et al., 2015 [6]	Cross-sectional, retrospective data analysis	Compared to White ladies, South Asians were younger (24·3 vs 27·1 years, P < 0·001), less seemingly to smoke (3·7% vs 17·9% P < 0·001) and had a better prevalence of skin disease (AN) (16·8% vs 3·1% P < 0·001), sort a pair of polygenic disorder (T2DM) (8·1% vs 5·6%, P < 0·01) and hirsuteness (88·5% vs 77·4%, P < 0·001), with lower heartbeat (126·5 vs 133·0 mmHg, P < 0·001), pulse BP (71·8 vs 75·1 mmHg P = 0·008) and BMI (29·3 vs 31·5 kg/m(2) P = 0·002). variations in weight remained once participants were classified as fat, overweight and traditional in line with ethnicity-specific cut-off points (P = 0·048). In each ethnicitiy, those aged ≥30 years recent had higher rates of fatness, T2DM, cardiovascular disease and physiological state, and fewer disease of the skin, and oligomenorrhoea. fatness was related to multiplied T2DM, AN, systolic/diastolic BP, hirsuteness and physiological state.
3	Nidhi et al., 2011 [7]	Cohort	Out of 460 ladies, one (0.22%) had oligo/amenorrhea with clinical hyperandrogenism, 29 (6.30%) had period with polycystic ovaries, one (0.22%) had polycystic ovaries with clinical hyperandrogenism and eleven (2.39%) had period with polycystic ovaries within the presence of clinical hyperandrogenism. Thus 42 (9.13%) ladies happy Rotterdam's criteria for PCOS, that exaggerated to fifty.46 (10.97%) once imputed knowledge were enclosed.
4	Kim et al., 2019 [8]	Cohort	The subjects with PCOS in the main consisted of young and non-obese girls. the foremost problematic subjective symptom was emission disturbance or physiological condition, and, on average, the patients appeared to flow each a pair of months. PCO morphology was determined in ninety six. 5% of the patients. though few girls visited hospitals as a result of angular distance symptoms alone, hirsuteness was determined in tierce of the patients (33.9%) and 0.5 (47.4%) of the patients had organic chemistry angular distance. regarding twenty percent (20.1%) of the patients had generalized fatness, and tierce (33.2%) had central fatness. Prevalence of dyslipidemia, diabetes, high blood pressure, and metabolic syndrome were 35. 7%, 3.5%, 4.0%, and 13.7%, severally. Prevalence of prediabetes was twenty. 8%, and a considerable proportion of extra subjects with traditional fast plasma aldohexose or oral glucose tolerance tests were known as having prediabetes by hemoprotein A1C testing.
5	Zhou et al., 2017 [9]	Case control	This study conduct in China. It examines total testosterone, androstenedione, and FAI secretion were increased in women with PCOS than in healthy population group (19-45 years).
6	Siddamalla et al., 2017 [10]	Case control	The VDR gene BsmI A/G ApaI A/C TaqI T/C in South Indian women, constitute an inheritable risk factor for PCOS
7	Dou et al., 2016 [11]	Cross-sectional	The research found body mass index (BMI), waist circumference (WC) and body fat percentage (PBF) indicate that these three parameters are useful in facilitating the screening or diagnosis of PCOS.

DISCUSSION

Insulin Resistance Associated with PCOS in Asia: Ethnic Differences

Resistance to insulin, which results in compensatory hyperinsulinemia, plays a key role in PCOS pathogenesis. Women with PCOS therefore have an increased risk of metabolic syndrome (MetS), prediabetes, type 2 diabetes, and cardiovascular disease potentially. Although the prevalence across background populations is varied (20–70 percent), obesity is also prevalent among women with PCOS. [8,12-14] A study reported that Asian women with PCOS were more likely than Whites to have diabetes, indicating that they also have metabolic complications. [15]

The prevalence of insulin resistance (IR) in PCOS patients varies depending on the measure used and the threshold (12.2–60.5 percent). [16] The Homeostasis Model Assessment (HOMA) of IR is the commonly used index in clinical and epidemiological research. IR was found in 60 normal weight controls in approximately 80 percent of 267 Italian women with PCOS based on 95 percent HOMA-IR trust limits. [17] In a US study, the prevalence of IR in women with PCOS was 64% based on age, body mass index (BMI), and race-adjusted upper 95th percentile of HOMA-IR. [18] In our Korean study, the optimal HOMA-IR for MetS diagnosis was 2.64 in women with (n=699) and without PCOS (n=572). [19] In this HOMA-IR cutoff, 34.8% of PCOS patients had evidence of IR. Like this, the prevalence of IR in PCOS patients varies depending on the cutoff, but PCOS women showed a higher degree of IR than ethnic controls. [20,21,22]

In the meantime, South Asians had higher levels of fasting insulin and lower sensitivity to insulin than Caucasians. [13,24] A high prevalence of PCOS among migrants from South Asia was reported, and their ethnic propensity to IR could be associated with this phenomenon. [25,26]

Therefore, the prevalence of insulin resistance in PCOS patients varies depending on the index used and the cutoff, but women with PCOS showed a higher degree of insulin resistance than those of controls across ethnicities. A comparative study reported that Asian women with PCOS were more likely to have diabetes compared with Caucasian patients, suggesting they also have metabolic complications. [27]

Hyperandrogenaemia

The study examines androgen profiles of women aged between 19 and 45 years with PCOS were compared with controls. The result shows, women with PCOS had an elevated androgen level (total testosterone, androstenedione and free androgen index) through their reproductive years. Elevated total testosterone, androstenedione, free testosterone and the free androgen index (FAI) are commonly used to identify hyperandrogenaemia. Hyperandrogenism is a critical feature and also one of the three main criteria for diagnosing PCOS. [9]

Genetics

Anomalies in calcium balance may also be partly responsible for the delayed follicular growth of women with PCOS and may even lead to PCOS syndrome pathogenesis. Recent studies suggest that vitamin D deficiency may be a causal factor in Insulin Resistance (IR) pathogenesis and PCOS metabolic syndrome. The gene of the vitamin D receptor (VDR), also known as the calcitriol receptor NR1I1, is considered a major candidate gene for PCOS. It is a ligand activated transcription factor which mediates the vitamin D genomic activities which control many endocrine functions and cell functions including bone metabolism and homeostasis of calcium phosphate. Many VDR polymorphisms have been examined for functional significance and potential effects of complex disease susceptibility such as osteoarthritis (OA), hypertension, obesity, high myopia, cardiovascular disease and tuberculosis.

At the Infertility Institute and Research Center (IIRC), Secunderabad,

Telangana, India, 95 women of reproductive age were recruited with PCOS and 130 healthy women without PCOS. All subjects were non-smokers and non pregnant (PCOS and controls). VDR: BsmI, ApaI and TaqI polymorphisms were analyzed using Polymerase Chain Reaction (PCR) and Fragment Length Polymorphism Restriction (RFLP) methods as described above. The frequencies of BsmI A/G polymorphism genotypes and alleles differed significantly between cases and controls. The distribution of genotype and allele showed a high prevalence of minor type allele (G) in both cases and controls. There was also a significant difference between cases and controls in ApaI A/C SNP. In contrast to controls, the incidence of C/C genotype was significantly high. Significant differences between cases and controls are observed in TaqI T/C SNP. The frequency of T/T genotype and the frequency of C/C genotype was significantly reduced compared to controls. The allele frequency also showed a similar trend indicating that 'C' allele could confer risk on PCOS and 'T' allele provides disease protection. The VDR gene BsmI A/G ApaI A/C TaqI T/C in South Indian women constitute an inheritable risk factor for PCOS. [10]

Obesity

Obesity is one of the factors of PCOS that has 3 parameters for its evaluation. The three parameters are the Body Mass Index (BMI), Waist Circumference (WC) and Body Fat Percentage (BFP) divided into two categories: the balanced control group and the PCOS group. Compared to the stable control group, WC, PBF and BMI have increased significantly in the PCOS population, suggesting that these three parameters are important in supporting PCOS screening and diagnosis. Rotterdam recommendations are used as a gold standard for predicting PCOS. [11]

CONCLUSION

Based on the review of literatures collected from various articles, it can be concluded that the risk factors of polycystic ovary syndrome among Asia women are insulin resistance, hyperandrogenemia, genetics, and obesity. Those risk factors have roles in the pathogenesis of polycystic ovary syndrome.

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