Research Article

PREVALENCE OF POLYCYSTIC OVARIAN SYNDROME: COMPREHENSIVE LITERATURE REVIEW

Dr Megha Sharma[1], Dr Sheen Job[2] and Prof. Vartika Saxena[3]

[1,2]MPH PG School of Public Health AIIMS Rishikesh
[3]Prof & HOD Dept of Community & Family Medicine, AIIMS Rishikesh

A R T I C L E   I N F O

A B S T R A C T

Introduction: Polycystic ovary condition (PCOS) is one of the endocrine disorder among girls. It is considered more of a syndrome rather than a disease and there are no single specified diagnostic criteria to help establish the condition.

Aims and Objectives: To understand the prevalence of PCOS in the Indian population, To compare the various diagnostic criteria in PCOS

Methodology: Databases namely the PubMed, Medline, the University of British Columbia Library and the Cochrane Library were searched.

Results: The studies that have been discussed have given meaningful insights into the prevalence of PCOS and the reasons for the difference in the prevalence rates. It is seen that the larger sample size contributes to a lesser prevalence rate and the other sociodemographic markers are only of academic value and cannot be incorporated. There is a need to develop Indian diagnostic criteria incorporating suitable components relevant to the Indian diaspora.

Conclusion: The present times demand to recognize the affected clientele and manage the condition in time and rescue them, before PCOS becomes a full-blown metabolic syndrome.

INTRODUCTION

There are many diseases which present with co-morbidities and some of which require medical management by specialists of various disciplines. One such condition which affects both health and well-being causing metabolic and psychological effects is PCOS.[1]

Polycystic ovary condition (PCOS) is a common endocrine disorder among girls. It is considered more of a syndrome rather than a disease and there is no single specified diagnostic criteria to help establish the condition.[2] It has numerous clinical presentations like menstrual disturbances, hirsutism and obesity. Prevalence of PCOS in numerous studies ranges from 2.2 to 26%. Different states in India show varying degrees of prevalence as no fixed criteria is established for diagnosis.[6]

It has been found that there is a strong correlation, between PCOS in girls and life style factors. It also shows a considerable effect on psychological factors, it also affects the fertility status of the target group, This condition is also known as Stein Leventhal syndrome, a gynaecological disorder with altered hormonal levels.[4]

Corresponding author: **Dr Megha Sharma**
MPH PG School of Public Health AIIMS Rishikesh

Table 1 The numbers of articles on PCOS, the total number of articles published and the proportion of articles on PCOS.

Journal	PCOS	Total	PCOS/total as %
Diabetes journals			
Lancet Diabetes and Endocrinology	0	924	0.0
Diabetes Care	36	15,867	0.23
Diabetes	34	15,713	0.22
Diabetologia	15	11,062	0.14
Diabetes Obesity Metabolism	4	2465	0.16
Clinical endocrinology journals			
Journal of Clinical Endocrinology and Metabolism	866	32,867	2.63
European Journal of Endocrinology	162	5484	3.0
Endocrine	71	3517	2.0
Basic endocrinology journals			
Journal of Endocrinology	61	15,042	0.40
Endocrinology	98	37,317	0.26
Clinical reproduction journals			
Fertility and Sterility	1288	23,528	5.47
Human Reproduction	732	13,935	5.3
Basic reproduction journals			
Reproduction	4	2853	0.1
Biology of Reproduction	66	13,807	0.5

The data were collected in early 2017 and the search terms used were 'PCOS' and 'polycystic', and both the titles and abstracts were searched in PubMed. The numbers of articles include articles containing primary data and review articles.

Aims and Objectives

1. The aim of the study is to understand the prevalence of PCOS in Indian population and determine the principal factors in the diagnosis of PCOS
2. To compare the various diagnostic criteria in PCOS, that is leading to varied prevalence rates. Various literature quote different prevalence rates due to the diverse diagnostic criteria adopted,hence the objective of the study is to clearly bring out the differences.

METHODOLOGY

Databases namely the PubMed, Medline, the University of British Columbia Library and the Cochrane library were

searched. Search terms that were incorporated, were a mix of "polycystic ovarian disorder AND prevalence".

The PubMed database with MESH terms and Boolean searches combining key words and modifiers such as AND, NOT, OR to extract better valued literature showing in depth research were used. The articles that were searched were in the previous five years. The references were additionally searched to acquire more data about specific content, which were cited by journals with high impact factor and cited frequently.

Dilemma in Diagnostic Criteria: India and the World

In the global scenario, a prospective study held in the USA, of 400 reproductive-aged women, the estimated prevalence of PCOS was 6.6%. The prevalence reported by the researchers was similar to the multicentre centric study held in parts of Europe. However, it is 65% higher than previously reported prevalence in south eastern USA women. This study was undertaken with the following diagnosis criteria, using a modified Ferriman-Gallwey method (hair distribution on nine areas of the body. Acne was recorded along with hirsutism, this emphasis on menstrual cycles irregularities, medication, gynaecological and family history. The difference in the prevalence rates with the previous study was because of the larger sample size. Of the women with menstrual irregularity and hirsutism 86% had PCOS. Only 8% of patients with menstrual dysfunction alone without hirsutism had PCOS.

A cross sectional study in North India, of 881 school girls of 13-18 years was held at Ahmedabad Gujarat. Rotterdam criteria was used for the study of PCOS. Insulin, testosterone and LH were estimated. The quality of life was also assessed using validated questionnaire.13% were diagnosed with PCOS by Rotterdam criteria. The higher percentage of PCOS was seen in girls in upper socioeconomic status and family history of diabetes.[4]

Similar study conducted in Hyderabad of 117 girls aged 15 to19 years, with symptoms of oligomenorrhea and/or hirsutism along with blood profile, hormonal profile and ultrasound investigation for identifying PCOS, on the basis of Rotterdam's criteria. Prevalence of PCOS obtained in the study was 11.96%[5]. However, no ultrasonographic investigations have been mentioned

A study conducted in central india 840 girls of age group 15–21 years were interviewed regarding PCOS using Rotterdam criteria. Predominantly USG investigation showed PCOS in the girls who were recommended for screening. This was proof enough that the target age group with Obesity, menstrual dysfunction and hormonal imbalance were more in favour of PCOS.[6] A study conducted in Dehradun, Uttarakhand with a sample size of 170 women in reproductive age group were interviewed regarding PCOS based on NIH criteria,along with lab tests to confirm PCOS. Out of 170 women investigated 70 women diagnosed as PCOS by NIH criteria. The prevalence of PCOS obtained in the study was 41%. Here Ultrasonographic records were compared. Prevalence of Oligomenorrhea in 40% of the participants, Menorrhagia was 12.8%and amenorrhea 11% in the study population. Common symptoms found in the affected women were hirsutism, acne, infertility and alopecia.[7]

Guidelines and Their Conformity

To bring about uniformity in the diagnostic criteria, few guidelines formulated over the years have gained international accreditation, which however, is interchangeably used for identification of PCOS.(Table 2)

The Rotterdam criteria stipulate two of the following symptoms (1) polycystic ovaries, (2) evidence of androgen excess and (3) oligo- or amenorrhea. The criteria recently acknowledged globally in conformity with the international evidence-based guideline for the assessment and management of PCOS. The National Institute of Health USA criteria (revised in 2012) is also widely used. In which two out of three criteria is to be satisfied namely oligo- or anovulation, clinical and/or biochemical signs of hyperandrogenism and /or Polycystic ovaries. There is another criteria laid down by the Androgen Excess-PCOS society 2006 , emphasising on presence of both criteria , in addition to the exclusion of related disorders, Clinical and/or biochemical signs of hyperandrogenism, Ovarian dysfunction (oligo anovulation and/or polycystic ovaries)

Table 2 Criteria for the Diagnosis of Polycystic Ovarian Syndrome [3][5][6][7][8]

National Institute Of Health (NIH) 1990 (First developed and most commonly used criteria)	To include all of the following: 1)Hyperandrogenism and/or hyperandrogenemia 2)Oligoovulation 3) Exclusion of related disorders (Zawadski and Dunaif, 1992).
ESHRE/ASRM (Rotterdam), 2003	To include two of the next, additionally to exclusion of related disorders: 1. Oligo-or anovulation 2. Clinical and/or biochemical signs of hyperandrogenism 3. Polycystic ovaries
AE-PCOS Society 2006	Presence of Both criteria , additionally to exclusion of related disorders: 1)Clinical and/or biochemical signs of hyperandrogenism 2) ovarian dysfunction (oligo anovulation and/or polycystic ovaries)
NIH 2012, International PCOS guidelines 2018	2 out of three criteria needed 1. Oligo- or anovulation 2. clinical and/or biochemical signs of hyperandrogenism 3. Polycystic ovaries

Table 3 Prevalence of Symptoms Associated with PCOS (%)

Author	Prevalence of symptoms associated with PCOS (%)							
	Poly cystic ovaries	Hirsutism	Acne	Androgenic alopecia	Menstrual disorders	Overweight	Obese	Infertility
N.A.Desai RY.Tiwaria S.S Patel[4]		47.05	37.81		29.41	60	20.58	
Archana singh K.vijaya Kaparti Sai Laxmi[20]	21	64		7	71	43	7	
Mahesh Gupta Veena Melwani[21]		24.5	32.9		25.8	12.7		
Anjali Choudhary Shweta Jain[22]		64.2	58.57	25	68		54	40
Nivetha.M Susan.G.Suganya		56.96	83.42		78.6			

[23]						
P.Rajkumari Janmejaya Sahoo[24]	12	20	6	34	28	8
Asgharnia M [25]	4.91	5.45		20.40		
Mehrabian F [26]	4.02			21.30	19.0	9.0
Salehpour S[27]	10.70	31.30	3.10			45.0
Ramezani Tehrani F [28]	16.80	33.80	3.50	18.30		

The studies that have been discussed has given meaningful insights into the prevalence of PCOS and the reasons for the difference in the prevalence rates. It has to be emphasised that the common criteria contributing to the diagnosis is Menstrual dysfunction, biochemical and hormonal markers and the ultrasonographic diagnosis. The challenge lies in the appropriate sample size of the target population. It is seen that the larger sample size contributes to a lesser prevalence rate and the other sociodemographic markers are only of academic value and cannot be incorporated in the criteria. In the Indian context, a lot has to be realised like the socio economic factors, as many have limited access to free specialised health care or are less informed or aware of the medical treatment and options available. Socioculturally, there is also a hesitation among the affected females to seek medical attention with the health providers. However, with India's growing economic power and social development, the coming years may see a fruitful change in reporting of PCOS across the country. The electronic health records which has been initiated by the Government of India will soon connect all available data across the country to give a better picture of PCOS. There is a need to develop an Indian diagnostic criteria incorporating suitable components relevant to the Indian diaspora

CONCLUSION

PCOS is not to be considered a disease but a complex syndrome which has numerous ramifications in health and well being. It needs to be seen as a phenomenon that is common in the early reproductive age group. PCOS and its consequences add to the health care burden across the World. The demand of the present times is to recognize the affected clientele and manage the condition in time and rescue them, before PCOS becomes a full blown metabolic syndrome.

References

1. Rodgers RJ, Avery JC, Moore VM, Davies MJ, Azziz R, Stener-Victorin E, Moran LJ, Robertson SA, Stepto NK, Norman RJ, Teede HJ. Complex diseases and co-morbidities: polycystic ovary syndrome and type 2 diabetes mellitus. Endocrine Connections. 2019 Mar 1;8(3):R71-5.
2. Neven AC, Laven J, Teede HJ, Boyle JA. A summary on polycystic ovary syndrome: diagnostic criteria, prevalence, clinical manifestations, and management according to the latest international guidelines. InSeminars in reproductive medicine 2018 Jan (Vol. 36, No. 01, pp. 005-012). Thieme Medical Publishers.
3. Teede HJ, Misso ML, Costello MF, Dokras A, Laven J, Moran L, Piltonen T, Norman RJ. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. Human Reproduction. 2018 Sep 1;33(9):1602-18.
4. Desai NA, Tiwari RY, Patel SS. Prevalence of polycystic ovary syndrome and its associated risk factors among adolescent and young girls in ahmedabad region. *Indian Journal of Pharmacy Practice*. 2018 Jul;11(3):119.
5. Sirmans SM, Pate KA. Epidemiology, diagnosis, and management of polycystic ovary syndrome. Clinical epidemiology. 2014;6:1.
6. Teede HJ, Misso ML, Costello MF, Dokras A, Laven J, Moran L, Piltonen T, Norman RJ. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. Human Reproduction. 2018 Sep 1;33(9):1602-18.
7. Teede HJ, Misso ML, Boyle JA, Garad RM, McAllister V, Downes L, Gibson-Helm M, Hart RJ, Rombauts L, Moran L, Dokras A. Translation and implementation of the Australian-led PCOS guideline: clinical summary and translation resources from the International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome. Medical Journal of Australia. 2018 Oct;209:S3-8.
8. Teede HJ, Misso ML, Costello MF, Dokras A, Laven J, Moran L, Piltonen T, Norman RJ, Network IP. Erratum. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. Human reproduction (Oxford, England). 2019 Feb;34 (2):388.
9. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS).Human reproduction. 2004 Jan 1;19 (1):41-7.
10. Dokras A, Bochner M, Hollinrake E, Markham S, VanVoorhis B, Jagasia DH. Screening women with polycystic ovary syndrome for metabolic syndrome. Obstetrics & Gynecology. 2005 Jul 1;106(1):131-7.
11. Harris HR, Titus LJ, Cramer DW, Terry KL. Long and irregular menstrual cycles, polycystic ovary syndrome, and ovarian cancer risk in a population-based case-control study. *International journal of cancer*. 2017 Jan 15;140(2):285-91.
12. van Hooff MH, Voorhorst FJ, Kaptein MB, Hirasing RA, Koppenaal C, Schoemaker J. Polycystic ovaries in adolescents and the relationship with menstrual cycle patterns, luteinizing hormone, androgens, and insulin. Fertility and sterility. 2000 Jul 1;74 (1):49-58.
13. Carmina E, Rosato F, Janni A. Extensive clinical experience. relative prevalence of different androgen excess disorders in 950 women referred because of clinical hyperandrogenism. 2006 Jan;91:2-6.
14. Guastella E, Longo RA, Carmina E. Clinical and endocrine characteristics of the main polycystic ovary syndrome phenotypes. Fertility and sterility. 2010 Nov 1;94 (6):2197-201.
15. . Ozdemir S, Ozdemir M, Görkemli H, Kiyici A, Bodur S. Specific dermatologic features of the polycystic ovary syndrome and its association with biochemical markers of the metabolic syndrome and hyperandrogenism. Acta obstetricia etgynecologica Scandinavica. 2010;89 (2):199-204.
16. Barth JH, Field HP, Yasmin E, Balen AH. Defining hyperandrogenism in polycystic ovary syndrome: measurement of testosterone and androstenedione by liquid chromatography-tandem mass spectrometry and

analysis by receiver operator characteristic plots. *European Journal of Endocrinology*. 2010 Mar 1;162 (3):611.

17. Atiomo WU, Pearson S, Shaw S, Prentice A, Dubbins P. Ultrasound criteria in the diagnosis of polycystic ovary syndrome (PCOS). Ultrasound in medicine & biology. 2000 Jul 1;26 (6):977-80.

18. Battaglia C, Mancini F, Persico N, Zaccaria V, de Aloysio D. Ultrasound evaluation of PCO, PCOS and OHSS. Reproductive biomedicine online. 2004 Jan 1;9 (6):614-9.

19. Wiweko B, Maidarti M, Priangga MD, Shafira N, Fernando D, Sumapraja K, Natadisastra M, Hestiantoro A. Anti-mullerian hormone as a diagnostic and prognostic tool for PCOS patients. *Journal of assisted reproduction and genetics*. 2014 Oct 1;31 (10):1311-6.

20. Singh A, Vijaya K, Laxmi KS. Prevalence of polycystic ovarian syndrome among adolescent girls: a prospective study. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*.;7 (11):4376.

21. Gupta M, Melwani V, Priya A, Toppo M, Khan A, Sethia S. A Study to Assess the Prevalence of Polycystic Ovarian Disease among Girls Aged 15–21 Years from Selected Schools and Colleges in Bhopal City. Ind. J. Youth Adol. Health. 2017;4 (3).

22. Choudhary A, Jain S, Chaudhari P. Prevalence and symptomatology of polycystic ovarian syndrome in Indian women: is there a rising incidence. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2017 Sep;6 (11):4971-5.

23. Nivetha M, Suganya SG. Survey of poly cystic ovarian disease (PCOD) among the girl students of Bishop Heber College, Trichirapalli, Tamil Nadu, India. IOSR J Nursing Health Sci. 2016;5:44-52.

24. Rajkumari P, Sahoo J, Sujata P, Sahoo G, Hansa J. Awareness about PCOS and the Likelihood of its Symptoms in Adolescent Girls in a Semi-Urban Set-Up: A Cross Sectional Study. *Journal of Medical Science & Clinical Research*. 2016;4 (11):12264-9.

25. Asgharnia M, Mirblook F, Soltani MA. The prevalence of polycystic ovary syndrome (PCOS) in high school students in Rasht in 2009 according to NIH criteria. *International journal of fertility & sterility*. 2011 Jan;4(4):156.

26. Mehrabian F, Khani B, Kelishadi R, Ghanbari E. The prevalence of polycystic ovary syndrome in Iranian women based on different diagnostic criteria. Endokrynologia Polska. 2011;62 (3):238-42.

27. Salehpour S, Akbari Sene A, Saharkhiz N, Sohrabi MR, Moghimian F. N-acetylcysteine as an adjuvant to clomiphene citrate for successful induction of ovulation in infertile patients with polycystic ovary syndrome. *Journal of Obstetrics and Gynaecology Research*. 2012 Sep;38(9):1182-6.

28. Tehrani FR, Simbar M, Tohidi M, Hosseinpanah F, Azizi F. The prevalence of polycystic ovary syndrome in a community sample of Iranian population: Iranian PCOS prevalence study. Reproductive Biology and Endocrinology. 2011 Dec;9 (1):39.

****