

Polycystic Ovary Syndrome and COVID-19: An Emerging Risk Factor

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Emerging evidence suggests that polycystic ovary syndrome (PCOS) increases susceptibility to coronavirus disease 2019 (COVID-19), in particular, when there are associated comorbidities of obesity, Type 2 diabetes mellitus (T2DM), fatty liver, and androgen excess.^[1] Insulin resistance in PCOS is linked to low-grade chronic inflammation as well as androgen excess which has a direct impact on adipocyte biology and metabolism. Gender advantage due to the protective effect of estrogen against COVID-19 seems to be lost due to androgen excess in women with PCOS.

The entry of the SARS-CoV-2 in the human cells occurs through host's angiotensin-converting enzyme 2 (ACE 2) receptors, and the host's transmembrane protease serine 2 (TMPRSS2) is an important factor to facilitate this entry. The TMPRSS2 is an androgen-dependent enzyme which plays a key role in the pathogenesis of severe lung injury in COVID-19. It is expressed mainly in the adult prostate which may explain the increased susceptibility of the male gender to severe COVID-19 complications. Thus, androgens may influence the clinical results in COVID-19 through the expression of TMPRSS2 and through androgen-mediated immune modulation.

Insulin resistance with excess insulin or proinsulin enhances steroidogenesis in women with PCOS. Weight gain and obesity, through their worsening effects on insulin resistance, augment steroidogenesis and hyperandrogenism. Hence, PCOS generates an hyperandrogenemic environment which predisposes to a higher susceptibility to COVID-19.^[2]

PCOS often has associated comorbidities of nonalcoholic fatty liver disease (NAFLD), obesity, metabolic syndrome, and even alterations in the gut microbiome which may further accentuate or increase susceptibility to COVID-19. Obese patients with advanced NAFLD have been shown to have increased hepatic mRNA expression of ACE2 and TMPRSS2,

the critical molecules for SARS-CoV-2 cellular entry (gender-specific differences may exist in the expression of these molecules).^[3] The link between gut microbiota altering metabolic environment is often present in PCOS. It has a key role in the pathogenesis of COVID when women with PCOS are exposed to SARS-CoV-2 virus.

There have been several reports now of increased COVID-19 infections in women with PCOS. Subramanian *et al.* carried out a population-based closed cohort study in the UK during its first wave of the SARS-CoV-2 pandemic (January to July 2020) including 21,292 women with PCOS and 78,310 controls matched for sex, age, and general practice location. Results revealed a 52% increased risk of COVID-19 infection in women with PCOS, which remained increased at 28% above controls after adjustment for age, BMI, impaired glucose regulation, and other explanatory variables.^[4]

There are some compelling data to link the risk of severe COVID-19 with certain factors such as hyperinflammation, insulin resistance, low Vitamin D levels, and hyperandrogenism, all of which have known direct associations with PCOS. Moreover, in this common female patient population, there is a high prevalence of multiple cardiometabolic conditions such as T2DM, obesity, fatty liver, and hypertension, which may significantly increase the risk for adverse COVID-19-related outcomes. Hence, women with PCOS are indeed a group which is “at risk” to severe COVID and its thrombo-inflammatory complications.

The author is the current Chair of International Diabetes Federation, South-East Asia, and a member of Covid-19 Maharashtra State Task Force.

Received: 02-06-2021
Accepted: 05-06-2021

Revised: 03-06-2021
Published: 28-06-2021

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Access this article online	
Quick Response Code: 	Website: www.jhrsonline.org
	DOI: 10.4103/jhrs.jhrs_79_21

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How to cite this article: Joshi SR. Polycystic ovary syndrome and COVID-19: An emerging risk factor. J Hum Reprod Sci 2021;14:211-2.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Ilias I, Goulas S, Zabuliene L. Polycystic ovary syndrome: Pathways and mechanisms for possible increased susceptibility to COVID-19. *World J Clin Cases* 2021;9:2711-20.
2. Foresta C, Rocca MS, Di Nisio A. Gender susceptibility to COVID-19: A review of the putative role of sex hormones and X chromosome. *J Endocrinol Invest* 2021;44:951-6.
3. Fondevila MF, Mercado-Gómez M, Rodríguez A, Gonzalez-Rellan MJ, Iruzubieta P, Valentí V, et al. Obese patients with NASH have increased hepatic expression of SARS-CoV-2 critical entry points. *J Hepatol* 2021;74:469-71.
4. Subramanian A, Anand A, Adderley NJ, Okoth K, Toulis KA, Gokhale K, *et al.* Increased COVID-19 infections in women with polycystic ovary syndrome: A population-based study. *Eur J Endocrinol* 2021;184:637-45.