Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

Prevalence of Metabolic Syndrome in Women with polycysticovariansyndrome

BommireddyPranavi, K.Saraswathi, Prema Elizabeth Jeyanthi David*

Department of Obstetrics &Gynaecology, SreeBalaji Medical College & Hospital Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

Corresponding author e-mail id:premelizabethjeyanthidavid.obg@bharathuniv.ac.in

ABSTRACT

The aim of this study was to use Rotterdam criteria to diagnose PCOS in women of reproductive age (both teenage girls and adult women). Two hundred and fifty women in their fertile years who have been diagnosed with PCOS are exposed to the current IDF guidelines for metabolic syndrome diagnosis. The prevalence of hirsutism/hyperandrogenism is higher in the metabolic syndrome population (61.7%) than in the non-metabolic syndrome group (38.3%), a statistically important difference with a P value of 0.001. Good lifestyle changes not only improve their menstrual and ovulatory symptoms, but they also help to prevent future cardiovascular and other morbid illnesses, paving the way for a healthy nation.

Keywords: diabetes mellitus, obesity, dyslipidemia, hypertension and atherosclerotic cardiovascular disease,

1.INTRODUCTION

PCOS (polycystic ovarian syndrome) is one of the most prevalent endocrine disorders in women of reproductive age, affecting 5% to 10% of women globally1. PCOS is a multisystem endocrinopathy characterized by ovarian presentation with multiple metabolic disorders and a broad range of clinical characteristics such as miscarriage, obesity, menstrual irregularities, and hyperandrogenism in women of reproductive age [1,2]. When a girl is maturing into a young adult, the various signs of PCOS begin at an early age.

Chronic anovulation, oligomenorrhea or amenorrhea, hyperandrogenism, and anatomy of the polycystic ovary on pelvic ultrasound are both symptoms of PCOS. Stein and Leventhal1 were the first to explain the connection between amenorrhoea and bilateral polycystic ovaries and obesity in 1935. The syndrome is an exclusionary disorder that has been the subject of much

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

discussion and many meanings over the years. In developing nations, it is the most prevalent cause of hyperandrogenism, hirsutism, and anovulatory infertility.

This hereditary disease tends to be passed on as a complex genetic condition, of polygenic and multifactorial genetic origins [3]. Insulin resistance, type 2 diabetes, obesity, dyslipidemia, hypertension, atherosclerotic cardiovascular disease, endometrial, hyperplasia, and endometrial cancer, obstructive sleep apnea, and mood disturbances are also more common among women with PCOS.

The metabolic syndrome (MetS) is a set of endocrine abnormalities that includes insulin resistance, dyslipidemia, obesity, and hypertension. In clinical practice and science, the term "metabolic syndrome" (also known as "syndrome X" or "insulin resistance syndrome") is sometimes used. It is made up of a slew of interconnected metabolic risk factors that develop as a result of underlying insulin resistance. As a result, the progression of atherosclerotic cardiovascular disease is aided. Central obesity, hypertriglyceridemia, low levels of high-density lipoprotein (HDL) cholesterol, hyperglycemia, and hypertension are the main characteristics of the metabolic syndrome. [4,1]

The prevalence of metabolic syndrome in PCOS has been studied in various populations, with 46.2 percent in India, 43 percent in the United States, 28.4 percent in Brazil, 24.9 percent in Hong Kong Chinese women, and just 1.6 percent in Czech women being registered.

3.

These disparate findings point to the need for a comprehensive assessment of metabolic syndrome in various populations, which will aid in the development of screening methods to mitigate long-term consequences.

(nine)

As a result, the aim of this study is to determine the prevalence of metabolic syndrome in women with PCOS in the reproductive age group who present to our hospital, using the International Diabetes Federation (IDF) criteria, so that appropriate lifestyle changes, pharmacological and non-pharmacological interventions will aid in combating and preventing one of the most deadly cardiovascular diseases. In this research, more strict metabolic syndrome requirements identified by the IDF were used due to the higher risk of metabolic syndrome in our ethnic group. [6]

2.MATERIALS AND METHODS

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

STUDY DESIGN: Prospectivestudy

PERIOD OF STUDY: august 2016 to febraury 2018 (18months)

PLACE OF STUDY: Gynaecology OPD, Sree Balajimedical college and hospital, Chromepet,Chennai.

SAMPLE SIZE : 250

INCLUSION CRITERIA

a. Reproductive age group women (20yrs – 40yrs) with PCOS
b. Infertility patients withPCOS
c. Obese women withPCOS
d. Women who give consent for thestudy

EXCLUSION CRITERIA

a. age <15yrs, >44years
b. hypothyroidism,hyperprolactinemia
c. secondary causes of androgenexcess
d. known cases of DM and HTN withoutPCOS
e. Womenwhodidn’tgiveconsentforthestudy

Both reproductive-age women with menstrual abnormalities, androgenic traits, infertility, or obesity who visit a gyanaecology out-patient clinic are screened for PCOS using Rotterdam guidelines. After describing the purpose of the study and securing informed consent for participation in the study, 250 women in the reproductive age group who were diagnosed with PCOS using the Rotterdam criterion and who met my inclusion criteria were included in the study. The updated IDF guidelines for diagnosing metabolic syndrome was applied to them.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

3.RESULTS

Table 1: Descriptive analysis of diagnostic parameters in the study population (N=250), according to new IDF criteria for diagnosis of MetS

Parameter	Frequency	Percent
WC category		
Up to 80cm	105	42.00%
80.1 cm andabove	145	58.00%
BMI		
Up to 30	198	79.20%
30.1 and above	52	20.80%
TGL category		
Up to 150 mg/dl	218	87.2%
150.1 mg/dl andabove	32	12.80%
FBS category		
Up to 100 mg/dl	164	65.60%
More than 100.1mg/dl	86	34.40%
HDL category		
Up to 49.9 mg/dl	86	34.40%
50 mg/dl and above	164	65.60%
DBP category		
Up to 85 mmHg	129	51.6%
86 mmHg and above	121	48.4%
SBP category		
Up to 130mmHg	241	96.40%
131 mmHg andmore	9	3.6%

Among the study population 105(42.00%) people had waist circumference up to 80 cm, 145 (58.00%) people had 80.1 and above. Among the study population 198(79.20%) had BMI up

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

to 30 and remaining 52(20.80%) had BMI. Among the study population 218 (87.2%) people had Triglycerides Up to 150 mg/dl, 32 (12.80%) people had 150.1 mg/dl and above. Among the study population 164 (65.60%) people had FBS category Up to 100 mg/dl, 86 (34.40%) people had 100.1 mg/dl and above. Among the study population 86 (34.40%) people had HDL Up to 49.9 mg/dl, 164 (65.60%) people had 50 mg/dl and above. Among the study population 241 (96.40%) people had systolic blood pressure Up to 130 mmHg, 9 (3.6%) people had 131 and above. Among the study population 129 (51.6%) people had diastolic blood pressure Up to 85 mmHg, 121 (48.4%) people had 86 and above. (Table1)

Figure1: Bar graph for metabolic syndrome distribution in study population(N=250)

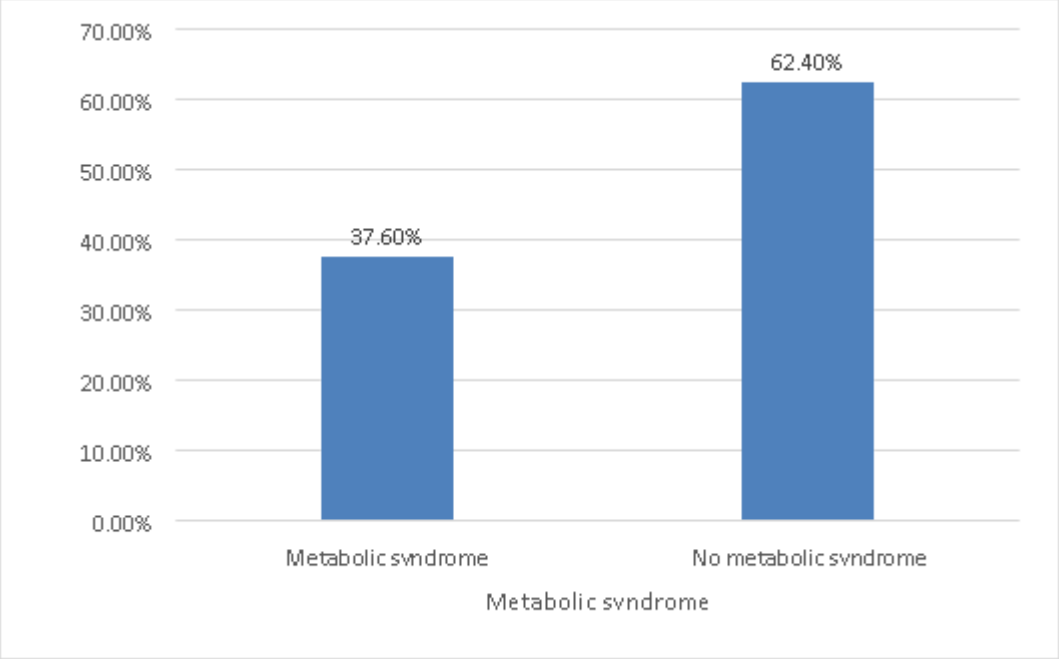


Table 2: Comparison of metabolic syndrome with age group(N=250)

Age group		Metabolic syndrome			Chi square	P-value
	Yes		No			
	Frequency	Percentage	Frequency	Percentage		

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

20 to25 (N=139)	42	30.2%	97	69.8%	7.712	*0.021*
26 to 30 (N=78)	35	44.9%	43	55.1%		
31 and above (N=33)	17	51.5%	16	48.5%		

ve table shows that as age increases, the prevalence percentage of metabolic syndrome increases. The difference between age group and metabolic syndrome was statistically significant. (P value 0.021).

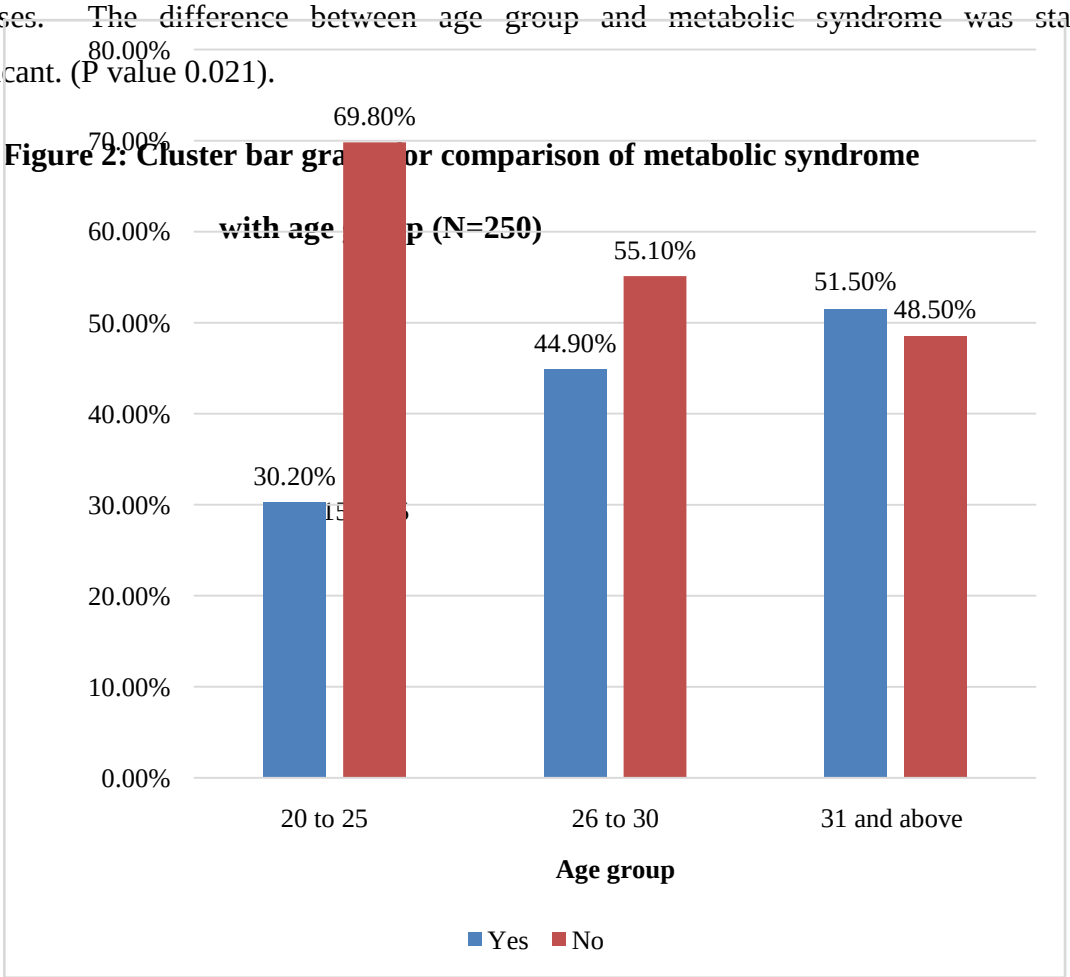


Figure 2: Cluster bar gra or comparison of metabolic syndrome with age p (N=250)

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

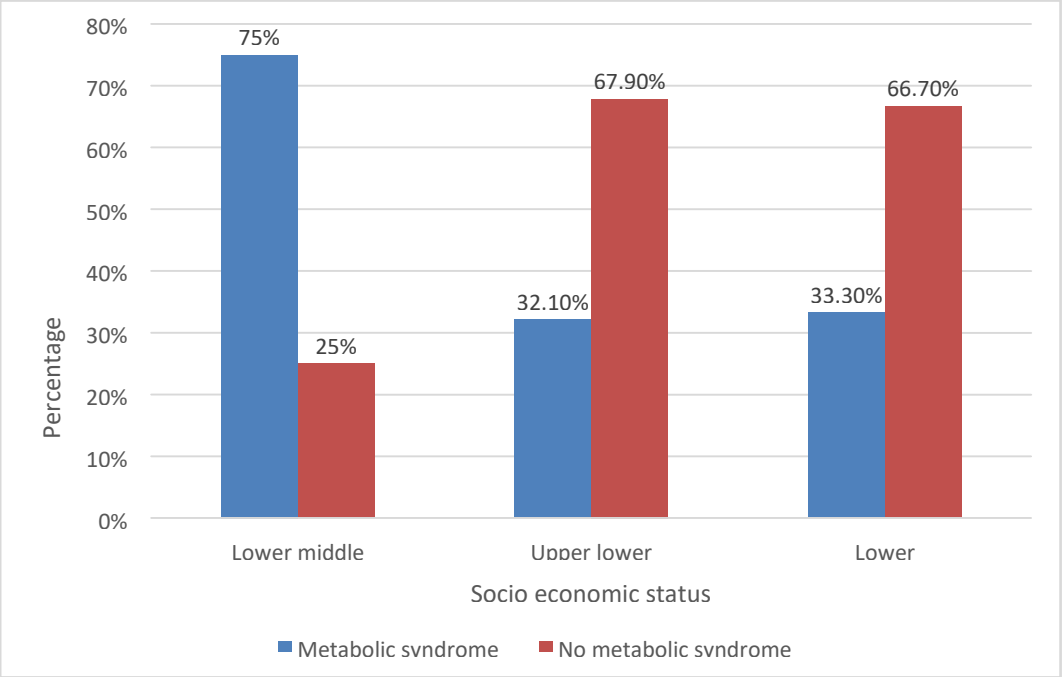
Table 3: Comparison of metabolic syndrome with socioeconomic status (N=250)

Socio economic status	Metabolic syndrome				Chi square	P-value
	Yes		No			
	Frequency	Percentage	Frequency	Percentage		
Lower middle (Class III) (N=32)	24	75%	8	25%	21.88	*<0.001*
Upper lower (ClassIV) (N=215)	69	32.1%	146	67.9%		
Lower (Class V) (N=3)	1	33.3%	2	66.7%		

According to kuppuswamy's socio economic status scale(2018), there are five 5 classes- upper(I), upper middle(II), lower middle(III), upper lower(IV) and lower(V). But in our study people belonging to class III,IV,V alone came to us.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

Figure 3: Cluster bar graph for comparison of metabolic syndrome with socioeconomic status (N=250)



The above table & figure shows that the prevalence of metabolic syndrome is more common in the class III socioeconomic status(75%) compared to class IV and class V population. The difference between socioeconomic status and metabolic syndrome was statistically significant. (P value <0.001)

Table 4: Comparison of metabolic syndrome with menstrual disturbance (N=250)

Menstrual disturbance	Metabolic syndrome				Chi square	P-value
	Yes		No			
	Frequency	Percentage	Frequency	Percentage		
Yes (N=211)	67	31.8%	144	68.2%	19.70	<0.001
No (N=39)	27	69.2%	12	30.8%		

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

e people with menstrual disturbance 67 (31.8%) people had metabolic syndrome. The difference between menstrual disturbance and metabolic syndrome was statistically significant. (P value <0.001).

Figure 4: Cluster bar graph for comparison of metabolic syndrome with TGL category (N=250)

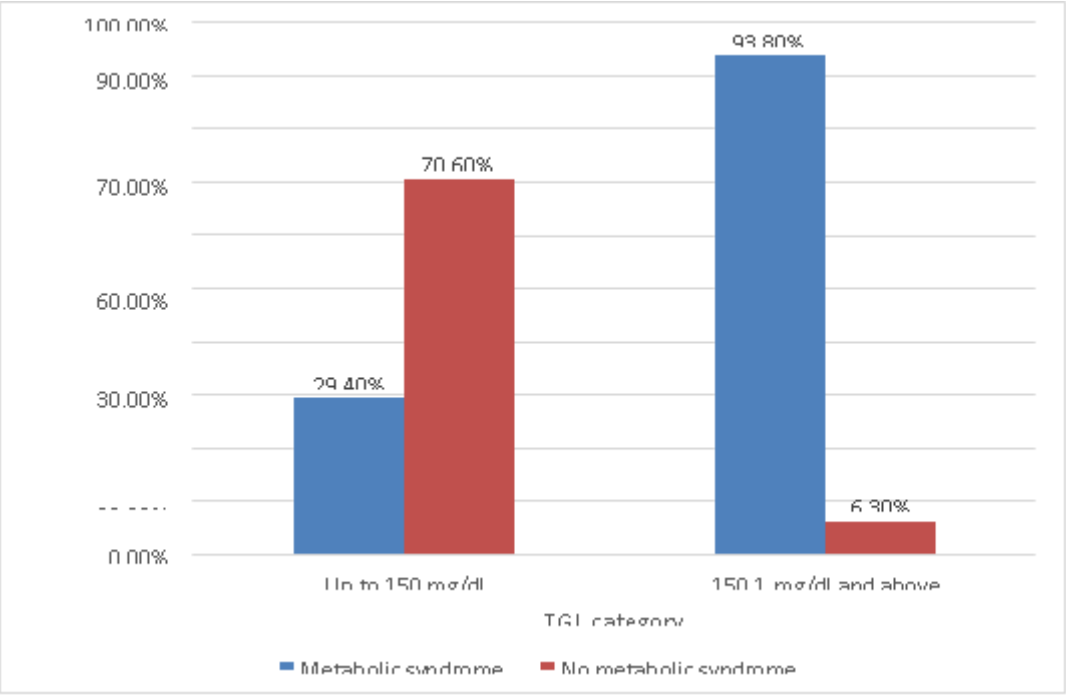


Table 5: Comparison of metabolic syndrome with HDL category (N=250)

HDL category	Metabolic syndrome				Chi square	P-value
	Yes		No			
	Frequency	Percentage	Frequency	Percentage		
Up to 49.9 mg/dl (N=86)	73	84.9%	13	15.1%	124.9	<0.001

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 3, 2021, Pages. 3658 - 3671
Received 16 February 2021; Accepted 08 March 2021.

50mg/dl and above (N=164)	21	12.8%	143	87.2%		

Among the people with HDL up to 49.9 mg/dl 73 (84.9%) people had metabolic syndrome. Among the people HDL 50 mg/dl and above 21 (12.8%) people had metabolic syndrome. The difference between HDL category and metabolic syndrome is statistically significant. (P value

<0.001). (Table16&figure22)

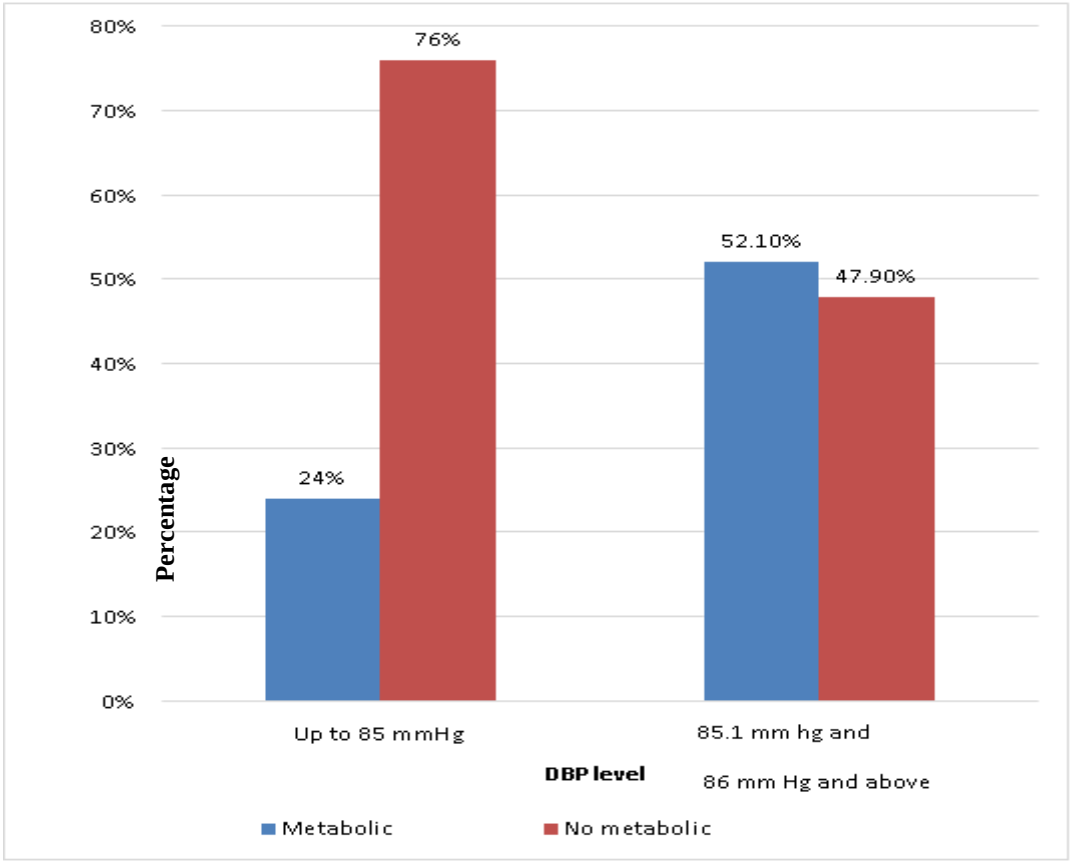
Table 6: Comparison of metabolic syndrome with DBP

category (N=250)

DBP category	Metabolic syndrome				Chi square	P-value
	Yes		No			
	Frequency	Percentage	Frequency	Percentage		
Up to85 mmHg (N=129)	31	24%	98	76%	20.91	<0.001
86 mm hg and above (N=121)	63	52.1%	58	47.9%		

Among the people with diastolic blood pressure up to 85 mm Hg 31 (24%) people had metabolic syndrome. Among the people with diastolic blood pressure more than 86 mm Hg 63 (52.1%) people had metabolic syndrome, making it statistically significant. (P value <0.001).

Figure 5: Cluster bar graph for comparison of metabolic syndrome with DBP category (N=250)



DISCUSSION

When compared to other Asian trials, such as those conducted in Thailand by Weerakiat et al. in 2007, Pantasri et al. in 2010, and Iran by Ashraf Moini et al. in 2012, the prevalence of MetS among PCOS patients was higher in our sample, with 35.3 percent, 24.3 percent, and 22.7 percent, respectively. This may be due to the fact that the mean BMI and WC in our sample were higher than in the other samples. MetS was found in 53.3 percent 52 and 37.5 percent 3 of PCOS patients, respectively, in some Indian studies performed in Mangalore and Vellore. (7) and (8)

Age was a major associated factor of MetS in our sample, which was close to other research, and we discovered that the prevalence of MetS among PCOS patients increased steadily from 30.2 percent at age 25 to 51.5 percent at age >30 years. According to Weerakiat et al., the prevalence of MetS in PCOS patients grew over time, from 22.5 percent at age 25 to 53.5 percent at age >30. 49 Another research conducted at Vellore by Kavita M et al. found that

the incidence of MetS increased with age, from 16 percent in women under the age of 25 to 100 percent in women over the age of 35 3. They came to the conclusion that the prevalence rate of MetS in PCOS patients was significantly influenced by age. Increased TGL was found to be the most common component of MetS, accompanied by decreased HDL and increased WC in this analysis. Reduced HDL was the most common factor in the analysis by Ashraf Moni et al., followed by elevated TGL and increased WC 51. Other studies by Jisha Varghese et al. and Sunita M Agade et al. found that decreased HDL was the most common variable, followed by increased WC and increased TGL 52,57. Increased WC was the most common variable, followed by decreased HDL, according to Cussons et al. from Australia and FerdousMehrabin et al. from Iran. 59,58 This disparity in the prevalence of individual MetS components may be attributed to racial and dietary differences in the population. [nine]

As a result, the relationship between PCOS and MetS seems to be correlative. Insulin tolerance, central obesity and associated adipose tissue causes, and vascular and coagulation disorders are some of the theories that have been proposed to explain this connection. Intrinsic insulin resistance, along with compensatory hyperinsulinemia, results in an unfavorable metabolic environment, with a proclivity for dyslipidemia and elevated androgen output from ovarian theca cells in PCOS. 11 and 12] Excess androgen can then serve as an endocrine modulator of MetS, exacerbating metabolic disruptions and central fat distribution (android pattern). Finally, this results in a vicious cycle of hyperinsulinism, hyperandrogenism, central obesity, and metabolic anomalies, resulting in the fascinating overlap of PCOS and MetS60. 13

CONCLUSION

With increased sedentary behavior and lack of physical activity in the new age of economically rising planet, which is a boon, there is also a bane. "Couch potato" refers to someone who leads a sedentary lifestyle. PCOS, which is a sedentary lifestyle and obesity-related disease, is on the rise as a result of the above causes. PCOS is a common disease that affects women of reproductive age, and it is the source of problems for one out of every four patients who see a gynecologist.

Since the prevalence of MetS in PCOS patients (37.6%) was so high in our research, it can be hypothesized that PCOS patients are at a high risk of developing CVD and CVA. As a result, it

becomes a significant concern when working with PCOS patients. Regardless of how well a prescribing doctor treats PCOS patients' infertility and menstrual symptoms, it is his or her responsibility to test for metabolic syndrome and provide guidance on healthier food, physical exercise, and weight loss.

Healthy life style modification not only improves their menstrual and ovulatory symptoms, but also prevents the future cardiovascular and other morbid ailments, paving way for a healthy nation.

Funding: No funding sources

Ethical approval: The study was approved by the Institutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGMENTS

The encouragement and support from Bharath University, Chennai is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

BIBLIOGRAPHY

1. Berekand Novak's gynaecology: fifteenth edition, pgno-1870,1872.
2. H Teede, A Deeksand L Moran : Polycystic ovary syndrome: a complex condition with psychological, reproductive and metabolic manifestations that impacts on health across the lifespan: BMC medicine 2010 :10.1186/1741-7015-8-41
3. Sperofftextbook of gynaecology, 23 rdedition9.
   Jeffcoate-s Principles of Gynaecology,8th Ed.
4. Richard AA[1], Shea K: Delineation of self-care and associated concepts.:J NursScholarsh.2011 Sep;43(3):255-64. doi:10.1111/j.1547 -5069.2011.
   01404.x. Epub 2011 Jul 25.
5. Conn JJ[1], Jacobs HS, Conway GS.: The prevalence of polycystic ovaries in women with type 2 diabetes mellitus.:2000 Jan;52(1):81-6.
6. VollenhovenB[1], Clark S, Kovacs G, Burger H: Prevalence of gestational diabetes mellitus in polycystic ovarian syndrome (PCOS)patientspregnant after ovulation induction with gonadotrophins.: 2000 Feb;40(1):54-8.
7. White MF: The IRS-signallingsystem: a network of docking proteins that mediate insulin action. : MolCell Biochem.1998May;182(1-2):3-11.
8. Cheatham B[1], Kahn CR: Insulin action and the insulin signaling network.:EndocrRev. 1995Apr;16(2):117-42.
9. SaltielAR[1], OlefskyJM.: Thiazolidinedionesin the treatment ofinsulin resistance and type II diabetes: 1996 Dec;45(12):1661-9.
10. SunitaM Aghade, JayshreeS Bavikar: Prevalence of metabolic syndrome among

reproductive aged women with polycystic ovarian syndrome: A study from west - central India:jp-journals-10054-0056.

11. Cussons AJ, Watts GF, Burke V, Shaw JE, ZimmetPZ, Stuckey BG.: Cardiometabolicrisk in polycystic ovary syndrome: a comparison of different approaches to defining the metabolic syndrome.: Hum Reprod2008 oct;23(10):2352-2358.
12. MehrabianF, KhaniB, KelishadiR, KermaniN.: The prevalence of metabolic syndrome and insulin resistance according to the phenotypic subgroups of polycystic ovary syndrome in a representative sampleof Iranian females.:J Res Med Sci2011 Jun;16(6):763-769.
13. MandrelleK, KamathMS, BonduDJ, ChandyA, AleyammaTK, George K.: Prevalence ofmetabolic

syndromein women with polycystic ovary syndrome attending an infertility clinic in a tertiary care hospital in South India.: J Hum ReprodSci2012 Jan-Apr;5(1):26-31.