PCOS-Epidemic in India: An Emerging Public Health Challenge

Rama Vaidya  MD, PhD  
Consult. Reprod. Endocrinologist,  
Vasudha Clinic, 81 B Saraswati Road,  
Santacruz (W), Mumbai.  
Ph 022 2649 2781, Mob. 09820239947  

Beena Joshi  MBBS, DRH  
Deputy Director,  
Dept. Operational Research  
NIRRH, ICMR Parel, Mumbai  
022 2419 2043, Mob 09820252672  

Director,  
Division Endocrine & Metabolic Disorders  
Medical Research Center-  
Kasturba Health Society  

Principal Investigator,  
PCOS Project ICMR Task Force  
NIRRH, ICMR Parel, Mumbai  

bjoshithane@gmail.com

Co-PI, ICMR-Advanced Center for Reverse Pharmacology in Traditional Medicine  
Vile Parle (W), Mumbai 400056  

vaidya.rama@gmail.com

International Conf  PCOS Society India  with  
AE-PCOS Society USA

RAV & BNJ 19-6-2016
PCOS-Epidemic in India: An Emerging Public Health Challenge

- Is PCOS-Epidemic Real?
- Is PCOS a relatively neglected NCD?
- Why PCOS is emerging as a Public Health Challenge?
- How much is the Socio-Economic Burden?
- India Specific suggestions for concerted actions
World Health Organization (WHO)

PCOS affected **116 million** women worldwide in 2012 (3.4% of women)

Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: *a systematic analysis for the Global Burden of Disease Study 2010.*

*Vos T et al*
PCOS-Epidemic: How Big Is the burden?

Prevalence of polycystic ovary syndrome using different diagnostic criteria

<table>
<thead>
<tr>
<th>Source</th>
<th>Population</th>
<th>NIH/NICHD</th>
<th>Rotterdam</th>
<th>Androgen excess and PCOS society</th>
</tr>
</thead>
<tbody>
<tr>
<td>March et al</td>
<td>728 Australian</td>
<td>8.7%</td>
<td>17.8%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Mehrabian et al</td>
<td>820 Iranian</td>
<td>7%</td>
<td>15.2%</td>
<td>7.92%</td>
</tr>
<tr>
<td>Asuncion M</td>
<td>154 Spain</td>
<td>6.5%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Yildiz et al</td>
<td>392 Turkish</td>
<td>7.1%</td>
<td>19.9%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Beena Joshi, et al</td>
<td>600 Indian</td>
<td>-</td>
<td>22.5%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>(Mumbai)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nidhi R et al</td>
<td>460 Indian</td>
<td>-</td>
<td>9.3%</td>
<td>-</td>
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<tr>
<td></td>
<td>(Andhra Pradesh)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Chhabra S et al</td>
<td>1182 Indian</td>
<td>-</td>
<td>8.4%</td>
<td>-</td>
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<tr>
<td></td>
<td>Rural (Sevagram)</td>
<td></td>
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<tr>
<td>Balaji S et al</td>
<td>163 Indian</td>
<td>-</td>
<td>18%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(Vellore)</td>
<td></td>
<td>(U 25%,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urban 63, Rural 63</td>
<td></td>
<td>R 11%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 12-19yrs</td>
<td></td>
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</table>

1.4 million Canadian women may be afflicted with PCOS
Balaji S et al
Outpatient Department of Balaji Hospital, Vellore district, Tamil Nadu
Convenient based sampling Rural, Urban population
12 and 19 years menarche 2 years before their existing complaint of menstrual disorder.

Beena Joshi, et al
Systematic multistage random sampling method
Sampled census block of Mumbai, Maharashtra
Attained menarche more than 2 years before the study,

Nidhi R et al
15 to 18 years from a residential college
Andhra Pradesh, South India

Chhabra S et al
Hospital Based Study Gynaecological Outpatient,
Rural Population, Sevagram, Maharashtra, Age group 15-34 y
*J Obstet Gynec* 2010;30:41-5

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PCOS
Who is treating this heterogeneous disorder?

- Dermatologists
- Cosmetologists
- Gynecologist
- Reproductive endocrinologist
- Medical Endocrinologist
- Molecular Endocrinologist/Geneticist
- Radiologist
- Accupuncture
- Homeopathy
- Ayurveda Aacharya
- Nutritions
- Reproductive endocrinologist
- Acupuncture
- LightSheer Duet laser
- RAV & BNJ 19-6-2016
Women may present with a variety of symptoms to **different healthcare providers** and may be **treated** only for the presenting symptoms without evaluation of the syndrome and its associated morbidities.

**multidisciplinary healthcare teams**

**Dokras A and Witchel SE**

Are young adult women with polycystic ovary syndrome slipping through the healthcare cracks?

*JCEM 2014;99:1583-5*
PCOS-Epidemic in India: An Emerging Public Health Challenge

PCOS is a relatively a neglected Non-Communicable Disease (NCD)

- Novel CVD risk factors by sex (PCOS)
- Long-term Hormonal Use from Early Age

Key Non-Communicable Diseases
1. Cancer
2. Cardio-Vascular Disease
3. Diabetes
4. Chronic kidney Disease

Strategies and methods to study female-specific cardiovascular health and disease: a guide for clinical scientists

Ouyang et al. *Biology of Sex Differences* (2016) 7:19

RAV June 19th 2016
Sleep Debt Epidemic of 21st Century

In a survey of sleep-patterns during Steps to Swasthya program for PCOS nearly 40% of them prefer to study for 4-5 hours at night as their home environment is more quiet and conducive for study in those hours. The others may simply engage themselves in watching TV, play video-games or are busy chatting with friends during wee hours of night.

Research on sleep debt chronic loss of sleep causes overeating, obesity, type 2 diabetes and metabolic perturbations. Extension of sleep hours, use of CPAP for sleep apnea may prevent or delay development of diabetes and co-morbidities.

“Yoga Nidra”, in particular, could rescue those sleep-deprived from ill effects of sleep-debt on their health. !!…… Yoga Nidra, guided meditation and relaxation, there is scant bio-medical research done in this area.

Vaidya RA
Sleep Debt of 21st Century
The Indian Practitioner 2016 June

Spiegel K, Leproult R, Cauter EV
Impact of sleep debt on metabolic and endocrine function
Lancet 1999; 354:1435-1439
# Prevalence of Obesity in PCOS

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>Over Weight</th>
<th>Obese</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aziz et al</td>
<td>USA</td>
<td>19.4</td>
<td>58.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dabadghao</td>
<td>Australia</td>
<td>OW +OB</td>
<td>86.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carmina et al</td>
<td>Italy</td>
<td>41.1</td>
<td>37.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaidya et al</td>
<td>India</td>
<td>60.9</td>
<td>28.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joshi et al</td>
<td>India</td>
<td>OW+OB</td>
<td>29%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Obesity:**

likely not a cause of PCOS
It exacerbates many aspects of the phenotype,

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Legro RS
Obesity and PCOS:
*Semin Reprod Med 2012;30:490-506*
A cross-sectional study of childhood and adolescent obesity in affluent school children from western suburb of Mumbai 2001-2002 and 2013-2014

Obesity (or Diabesity) in Children & Adolescents

Parallel rise in incidence of Type 2 diabetes in children & levels of obesity from 1975-1995 among Japanese school children

Alberti G et al, Diabetes Care 2004;27:1798-11

“I miss sweets and chocolates but I am used to it now.”
– Kalpana Sharma, 10yrs
India Today. Oct 6; 2003; 21
### Insulin Resistance in Adolescent PCOS (N=79)

<table>
<thead>
<tr>
<th>Adolescent PCOS BMI</th>
<th>IFG/IGT</th>
<th>Type 2 DM</th>
<th>Insulin Resistance FG/FI&lt;4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean N=39</td>
<td>N=2</td>
<td>-</td>
<td>10/39 (25.6%)</td>
</tr>
<tr>
<td>Over Weight N=9</td>
<td>-</td>
<td>-</td>
<td>4/9 (44.4%)</td>
</tr>
<tr>
<td>Obese N=31</td>
<td>-</td>
<td>-</td>
<td>22/31 (71%)</td>
</tr>
<tr>
<td><strong>Total N=79</strong></td>
<td></td>
<td></td>
<td><strong>36/79 (45.5%)</strong></td>
</tr>
</tbody>
</table>

### Insulin Resistance in Adult PCOS (N=128)

<table>
<thead>
<tr>
<th>Group Adult PCOS BMI</th>
<th>IFG/IGT</th>
<th>Type 2 DM</th>
<th>Insulin Resistance FG/FI&lt;4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean N=57</td>
<td>-</td>
<td>-</td>
<td>15/57 (26.3%)</td>
</tr>
<tr>
<td>Over Weight N=18</td>
<td>N=1</td>
<td>-</td>
<td>4/18 (22.2%)</td>
</tr>
<tr>
<td>Obese N=53</td>
<td>N=2</td>
<td>N=1</td>
<td>27/53 (50.9%)</td>
</tr>
<tr>
<td><strong>Total N=128</strong></td>
<td></td>
<td></td>
<td><strong>46/128 (35.9%)</strong></td>
</tr>
</tbody>
</table>

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Rege NR, Gogte J, Vaidya AB, Vaidya RA (unpublished data)
### Insulin and Adipokines in PCOS (N=35)

<table>
<thead>
<tr>
<th>Group</th>
<th>Insulin AUC</th>
<th>Leptin (ng/ml)</th>
<th>Adiponectin (ug/ml)</th>
<th>TNF-alfa (pg/ml)</th>
<th>Hs CRP (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese IR (n=22)</td>
<td>254.1 ± 96.4</td>
<td>85.9 ± 42.7</td>
<td>4.3 ± 1.7</td>
<td>40.8 ± 28.1</td>
<td>9.9 ± 6.4</td>
</tr>
<tr>
<td>Obese non-IR (n=7)</td>
<td>99.5 ± 42.4</td>
<td>67.1 ± 24.8</td>
<td>5.6 ± 1.3</td>
<td>16.9 ± 12.7</td>
<td>8.6 ± 4.1</td>
</tr>
<tr>
<td>Non Obese IR (n=6)</td>
<td>276.4 ± 115.3</td>
<td>50.9 ± 23.6</td>
<td>5.9 ± 2.3</td>
<td>26.7 ± 24.5</td>
<td>7.5 ± 7.8</td>
</tr>
</tbody>
</table>

### Control (n=22)

<table>
<thead>
<tr>
<th></th>
<th>HS-CRP (mg/dl)</th>
<th>Adiponectin</th>
<th>WBC (c.mm)</th>
<th>FG/FI</th>
<th>Ins.Fasting (uIU/ml)</th>
<th>Ins.2 hr PG (uIU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Range</td>
<td>10.24</td>
<td>6825.00</td>
<td>12.6</td>
<td>6.60</td>
<td>44.47</td>
</tr>
<tr>
<td>STD (±)</td>
<td>&lt; 1.0 – 2.3</td>
<td>2.32</td>
<td>2292.56</td>
<td>6.21</td>
<td>2.62</td>
<td>25.58</td>
</tr>
</tbody>
</table>

---

**Vaidya RA, Pandey SN, Vaidya ADB**  
PCOS: Is it a chronic Inflammatory Disease?  
ECAB Clinical Update Obstetrics & Gynecology .2008;42:73

**Mertia P, Agashe S, Rege N, Vaidya R**  
Polycystic Ovary and Leuocytosis  
The Indian Practitioner 2014
Economic burden to a woman affected with PCOS

India, being the diabetic capital of the world, has close relation to PCOS–MS continuum and policymakers should get alarmed to the existence of this metabolic malady and prevent the birth of the consequent disorders.

M. Ashraf Ganie and Sanjay Kalra

Polycystic ovary syndrome – A metabolic malady, the mother of all lifestyle disorders in women – Can Indian health budget tackle it in future?

**Economic burden to a woman affected with PCOS**

- **Metabolic & CVD**
  - Per session: ₹ 4000 - 50000

- **Cosmetologic therapies**
  - Per session: ₹ 7000

- **Initial evaluation**
  - ₹ 4000 - 5000

- **Menstrual disorders, infertility**
  - Per month: ₹ 5000 – 1 L (IVF)

- **Lifestyle MRx**
  - ₹ 20-50000/yr
India Specific suggestions for concerted actions

Four-tier Heath Care for PCOS with feed-back loops between tiers and strong net-working (Federal Policy-State Resource)

PCOS Advanced Centers:
Strategy, Research, Advanced Education, Models of Services

PG Institutes;
Modules of Multispecialty Clinics, Training Programs

District Hospitals/Private Sectors:
Awareness Programs, Camps, Bridge Models of Care

Primary Health Care Units:
Awareness and Referral Net-work, Community Involvement
Genetic Vulnerability

Adolescent Hyperandrogenism

Precocious Pubarche

Intra Uterine Growth Retardation

Eno. Ca
C.V.D.
Diabetes, Hypertension

Foetal wastage
Gestational Diabetes

P.S.U Disorders
Mens. dysfn Infertility

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Acknowledgement

**Vasudha Clinic**
Jaya Gogate
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Namyata Pathak
Nutan Nabar
Hiteshi Dhami
Prajakta Paradkar
Zankruti Parikh
Mona Shah

**NIRRH - ICMR**
Sanjay Chauhan
Beena Joshi
Srbani Mukharji
Anushree
Smita Mahale

**Multidisciplinary Opinion**
On challenges in Medical Management of PCOS
Gulrez Tyebkhan
Priti Vyas
Reena Wani
Beena Joshi
Srabani Mukherji
Sangeeta Velskar
Jaya Gogate
Rishma Dhilon Pai
Roda Dalal
Sanjay Chauhan
Rashmi Parikh