

The potential role of bisphenol A (BPA) in the pathogenesis of polycystic ovary syndrome (PCOS)

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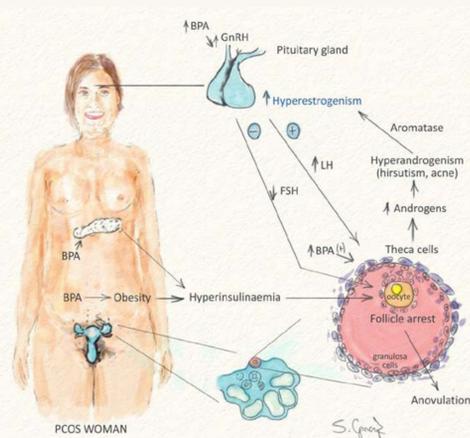
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Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrinopathy in women of reproductive age (Azziz, Woods et al. 2004), that lead to infertility, type 2 diabetes and coronary heart disease (Mani, Levy et al. 2012).

Bisphenol A (BPA) is one of the most abundant chemicals produced worldwide and is used as a plasticizer in daily life. It can interact with estrogen receptors, androgen receptors and peroxisome proliferator-activated receptors gamma (PPAR γ) (Kuiper, Lemmen et al. 1998; Riu, Grimaldi et al. 2011).



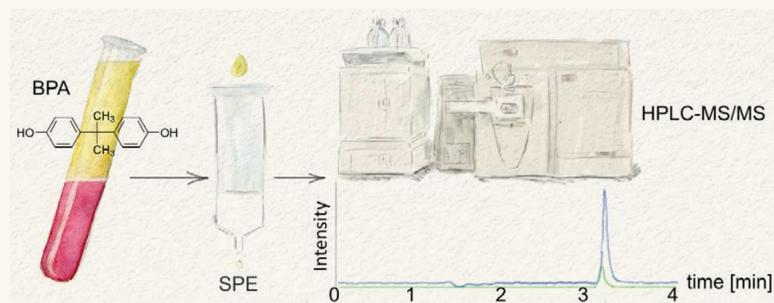
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The potential role of BPA in the pathogenesis of PCOS. Hypothalamic BPA exposure activates GnRH pulse generator, which in turn leads to the increased LH and decreased FSH. It can stimulate androgen production in the ovarian theca. BPA can also interact with the receptors in adipose tissue and stimulate pancreatic beta cells to insulin production which both result in increased lipid accumulation in the adipose tissue. All of these effects impair ovarian folliculogenesis leading to anovulation.

Aim of study was to identify the potential role of BPA in the pathogenesis of PCOS.

Materials and methods

In total 79 women were studied. Thirty five (mean age 24.71 \pm 4.65) were diagnosed with PCOS according to the ESHRE/ASRME (Rotterdam Criteria) consensus. The control group consisted of 44 women (mean age 26.59 \pm 6.44) without PCOS. Serum levels of prolactin (PRL), 17OH-progesteron, total testosterone, 17 β -estradiol, insulin and sex hormone binding globulin (SHBG) were measured.



BPA concentrations were analysed in all women's sera using high pressure liquid chromatography method combined with mass spectrometry (HPLC-MS/MS analysis, The Agilent 1200 HPLC system).

Results

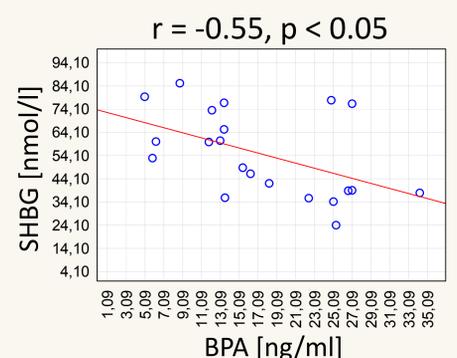
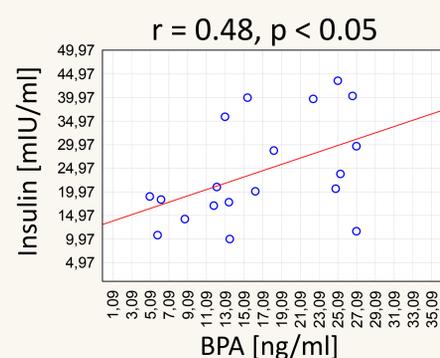
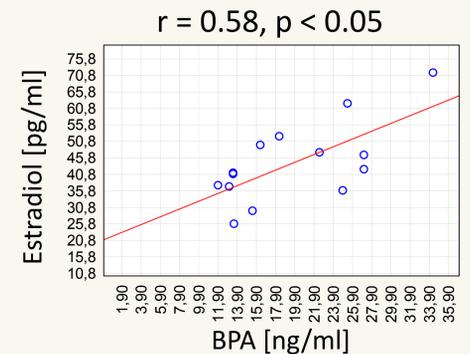
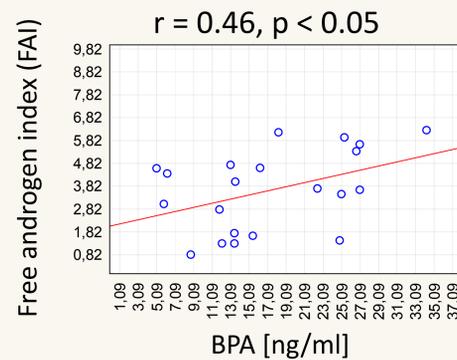
Clinical characteristics of women

Parameter	CONTROL	PCOS	p
Age (yrs)	26.59 \pm 6.44	24.71 \pm 4.65	0.50
BMI	21.92 \pm 1.37	21.92 \pm 1.38	0.98
PRL [ng/ml]	13.73 \pm 9.77	14.06 \pm 12.08	0.79
17OH-Progesterone [ng/ml]	1.87 \pm 1.29	1.57 \pm 0.66	0.78
Total testosterone [nmol/l]	1.28 \pm 0.51	1.76 \pm 0.75	0.006
FAI	2.67 \pm 1.53	3.74 \pm 2.01	0.022
LH/FSH	1.45 \pm 1.14	1.93 \pm 1.11	0.015
Insulin [mIU/ml]	26.29 \pm 13.85	28.05 \pm 13.48	0.36
SHBG [nmol/l]	60.81 \pm 29.44	56.51 \pm 24.27	0.36
BPA [ng/ml]	12.97 \pm 8.19	17.48 \pm 8.28	0.05

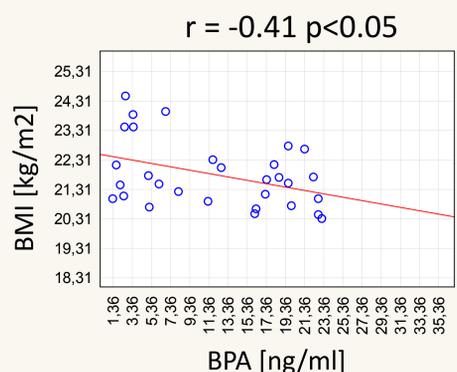
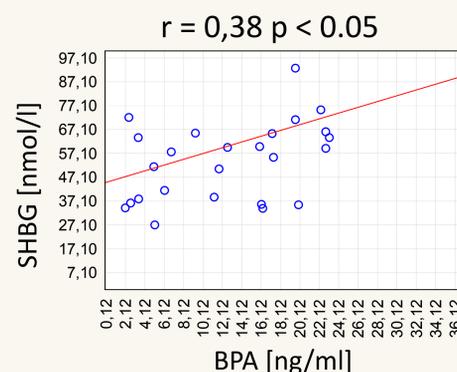
Abbreviations: yrs – years, BMI – Body Mass Index, PRL – prolactin, FAI – free androgen index, LH – luteinizing hormone, FSH – folliculotropic hormone, SHBG – sex hormone binding globulin, BPA – bisphenol A

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Correlation between serum BPA concentrations and selected clinical and biochemical parameters in women with PCOS



Correlation between serum BPA concentrations and selected clinical and biochemical parameters in healthy women (control)



Results summary

1. Serum BPA concentration was higher in women with PCOS.
2. There were positive correlation between serum BPA concentration and FAI, estradiol and insulin level in women with PCOS.
3. There were positive correlation between serum BPA concentration and SHBG concentration in healthy women.
4. There were negative correlation between serum BPA concentration and SHBG concentration in women with PCOS and BMI in healthy women.
5. There were no differences between BPA concentration and total testosterone, 17OH-progesterone and prolactin level.
6. There were also no association between BPA level and LH/FSH ratio.

Conclusions

These results confirmed the hypothesis of higher levels of BPA in PCOS women, that can exacerbate the androgen production. It seems that BPA may play role in PCOS pathogenesis, but further investigation should be used.

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