

Gender-specific differences in hypothalamus-pituitary-adrenal axis activity in children. A meta-analysis

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Introduction

Cardiovascular disease susceptibility is gender-specific¹, which has been suggested to be due to gender differences in HPA axis activity, stress vulnerability and responsivity². Gender-specific differences in hypothalamus-pituitary-adrenal axis activity have been postulated to emerge during puberty³. We aimed to study whether such differences are already present in childhood.

Objectives

We conducted a systematic review and meta-analysis with the hypothesis that gender-specific differences in HPA axis activity are present in early life.

Methods

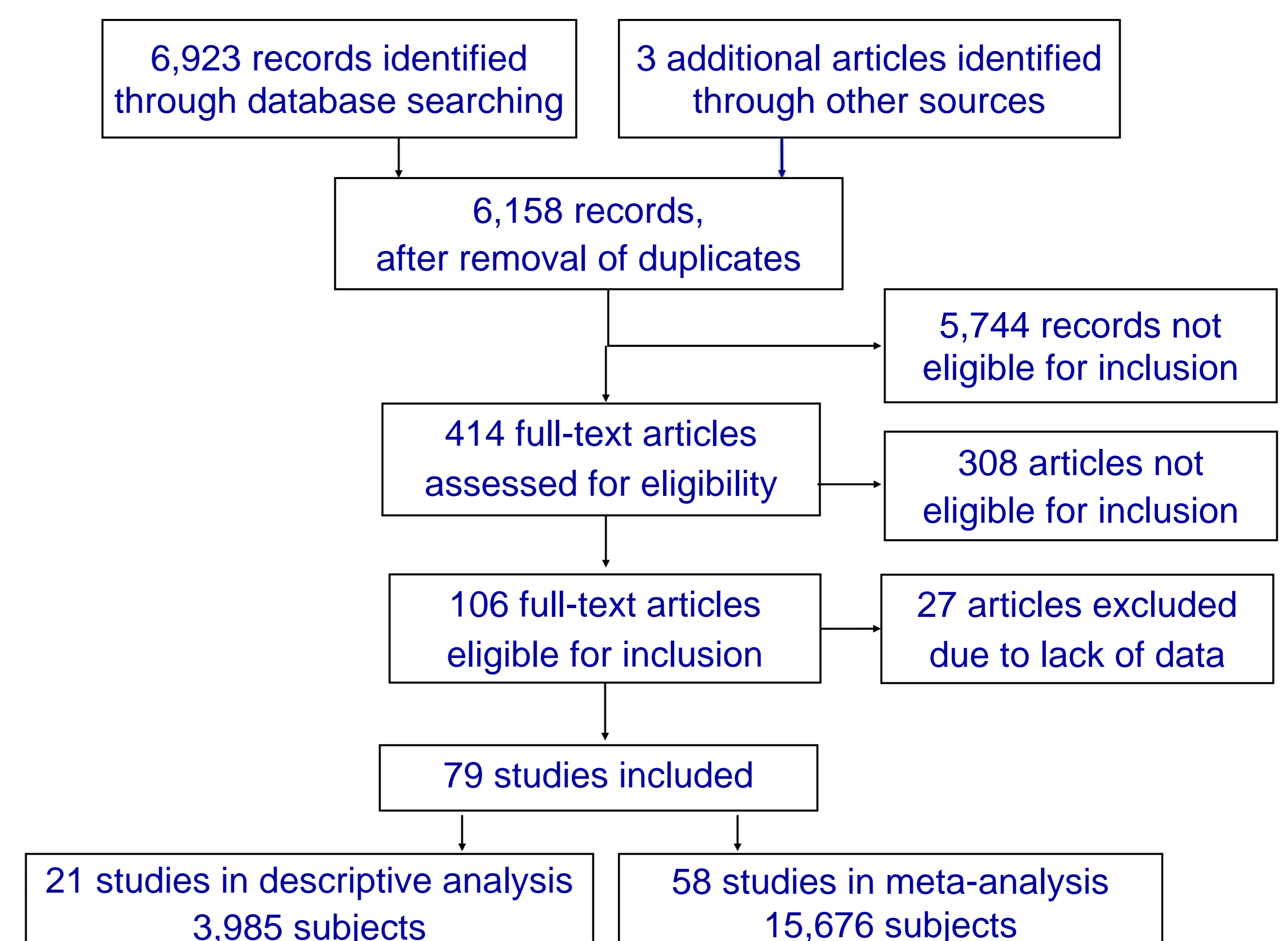
Search In PubMed and Embase.com from inception to January 2016. Figure 1 presents the different phases of the systematic review and meta-analysis, conform the PRISMA-statement.

Criteria Studies that assessed random, non-stimulated cortisol in serum or saliva, or cortisol in 24hr-urine in healthy males and females aged ≤18 yr who did not use glucocorticoid-containing medications

Analysis Standardized mean differences (95% CIs) were calculated and analyzed using fixed-effect meta-analysis for two age groups:

- <8yr (prepubertal)
- 8–18yr (peri-/postpubertal)

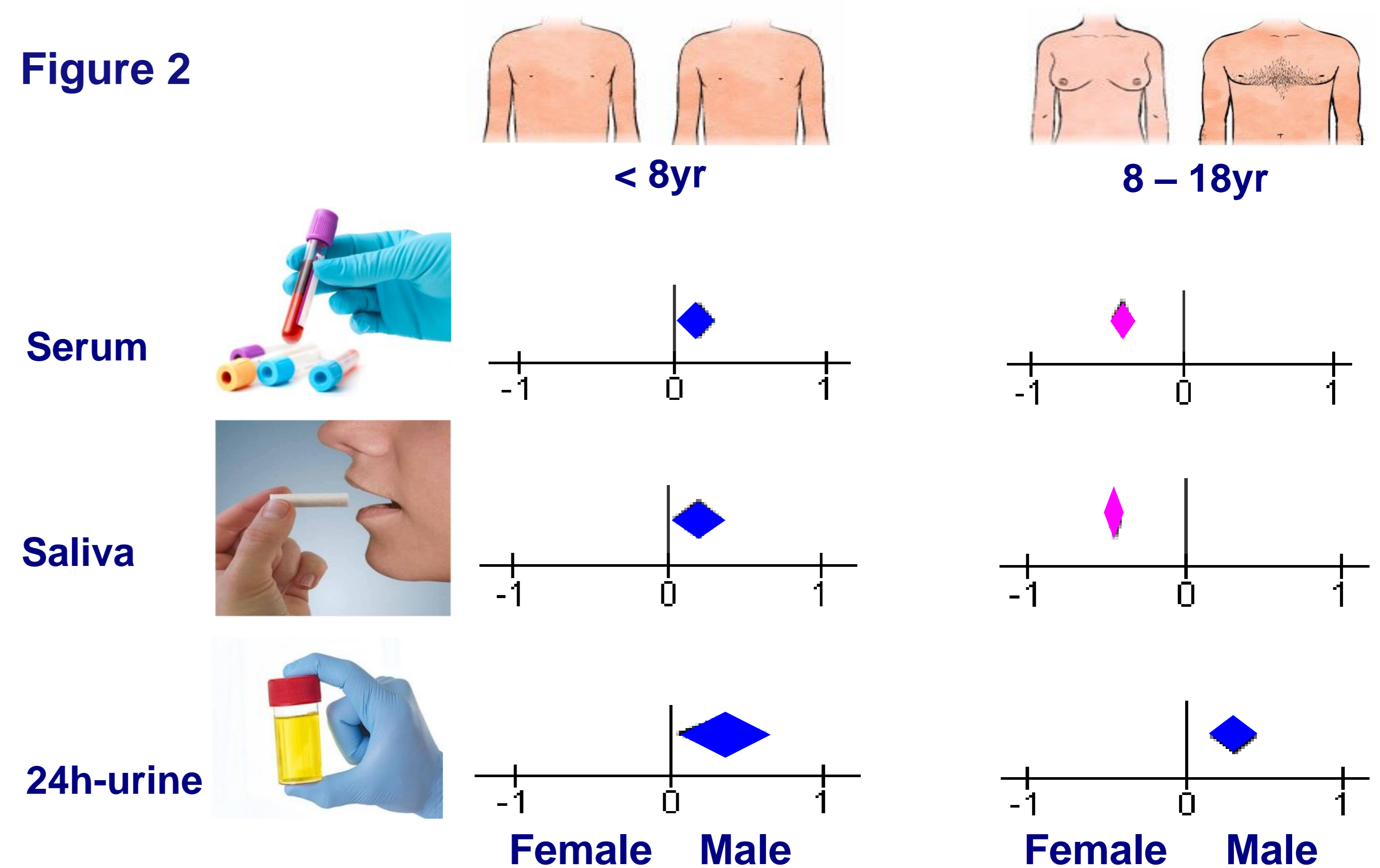
Figure 1



Results

58 articles (15,676 subjects) were included in the meta-analysis. Compared to girls, boys aged <8yr had 0.17 (0.05; 0.29) nmol/L higher serum, 0.21 (0.05; 0.37) nmol/L higher salivary, and 0.34 (0.05; 0.64) µg/24h higher 24h-urine cortisol levels. Boys aged 8-18yr had 0.39 (0.32; 0.46) nmol/L lower serum, 0.42 (0.38; 0.47) nmol/L lower salivary, and 0.32 (0.17; 0.47) µg/24h higher 24h-urine cortisol levels. (Fig. 2)

Figure 2



Conclusion

Gender differences in HPA axis activity are present early in life, with higher cortisol concentrations in boys, as compared to girls. A gender-specific evolution of cortisol metabolism seems to be induced by puberty, resulting in lower random, non-stimulated cortisol levels in boys after age 8yr, whereas the difference in cortisol production seems to be stable between genders with age. Although gender differences found were small, they might contribute to differences in the origins of health and disease⁴.

References

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