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Sex hormone levels in alcohol dependent men and women

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Background: Growing body of evidence indicates the diminishing role of the socio-cultural (gender-related) factors in perception of alcohol consumption and its consequences, including development of alcohol dependence (AD). At the same time, biological (sex-specific) differences in alcohol effects (e.g. pharmacokinetics) or vulnerability to AD, its progression, and treatment response in alcohol-dependent men and women remain unchanged. The biological mechanisms underlying these differences remain poorly understood; however, it is possible that sex hormone levels may play important role. We have previously demonstrated that testosterone and sex hormone binding globulin (SHBG) levels may be associated with alcohol dependence (AD) and related phenotypes in a relatively small cohort of men undergoing residential treatment.

Objective: In this study, we aimed to assess whether similar associations persist in a larger cohort of alcohol dependent men and women compared to controls.

Methods : Clinical and demographic information as well as hormone levels including total testosterone, estradiol, and SHBG from 682 alcohol dependent women (age 54.9+/-7.9), 251,533 non-alcohol dependent women (age 56.6+/-8.0), 2,218 alcohol dependent men (age 56.2+/-7.8), and 200,285 non-alcohol dependent men (age 56.9+/-8.2) from the UK Biobank were analyzed. Presence or absence of AD was determined based on ICD-10 criteria. Subjects not meeting ICD-10 criteria for AD but with Alcohol Use Disorders Identification Test (AUDIT) score equal or above 8 were excluded from analyses. Association results were adjusted for age (and menopause in women), BMI, and age-hormone interactions where statistically significant.

Results: We discovered that SHBG and testosterone levels were significantly higher in alcohol dependent women compared to non-alcohol dependent women, after adjusting for age (66.0+/-33.4 vs. 61.8+/-31.0, p=0.006; 1.3+/-0.7 vs. 1.1+/-0.6, p<0.0001, respectively). After adjusting for both age and BMI, SHBG and testosterone were also significantly higher in alcohol dependent men compared to non-alcohol dependent men (48.8+/-24.9 vs. 39.6+/-16.7, p<0.001; 13.0+/-4.7 vs. 12.0+/-3.7, p<0.001, respectively). In men, this association was inversely dependent on age (age-hormone interaction p-value<0.0001 for both SHBG and testosterone). Estradiol levels were also marginally higher in alcohol dependent men (233.6+/-87.2 vs. 222.7+/-81.0; p=0.013 and p=0.03 after adjusting for age), but not in alcohol dependent women (536.5+/-470.8 vs. 501.6+/-479.7, p=0.359 and p=0.31 after adjusting for age).

Conclusions: Findings in this larger cohort support previous reports associating testosterone and SHBG levels with presence of AD in men. We also discovered presense of the similar associations between elevated testosterone and SHBG levels with AD in women. Moreover, there is also a trend suggesting potential association between AD and elevated estradiol levels in men but not in women. These findings indicate that differences in SHBG, testosterone and, potentially, estradiol levels may play a role in vulnerability to alcohol dependence in men and women. Future studies are needed to investigate the biological mechanisms underlying these associations and their relevance to AD treatment.

No conflict of interest

Topics:

Addiction
Biochemistry