

Soy Food and Isoflavone Intake in Relation to Semen Quality Parameters among Men from an Infertility Clinic

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BACKGROUND: High isoflavone intake has been related to decreased fertility in animal studies, but data in humans are scarce. Thus, we examined the association of soy foods and isoflavones intake with semen quality parameters.

METHODS: The intake of 15 soy-based foods in the previous 3 months was assessed for 99 male partners of subfertile couples who presented for semen analyses to the Massachusetts General Hospital Fertility Center. Linear and quantile regression were used to determine the association of soy foods and isoflavones intake with semen quality parameters while adjusting for personal characteristics.

RESULTS: There was an inverse association between soy food intake and sperm concentration that remained significant after accounting for age, abstinence time, body mass index, caffeine and alcohol intake and smoking. In the multivariate-adjusted analyses, men in the highest category of soy food intake had 41 million sperm/ml less than men who did not consume soy foods (95% confidence interval 5 –74, –8; P, trend 5 0.02). Results for individual soy isoflavones were similar to the results for soy foods and were strongest for glycitein, but did not reach statistical significance. The inverse relation between soy food intake and sperm concentration was more pronounced in the high end of the distribution (90th and 75th percentile) and among overweight or obese men. Soy food and soy isoflavone intake were unrelated to sperm motility, sperm morphology or ejaculate volume.

CONCLUSIONS: These data suggest that higher intake of soy foods and soy isoflavones is associated with lower sperm concentration.

Keywords: soy; isoflavones; semen analysis; sperm concentration; infertility

Introduction

Xenoestrogens have been suggested to play a role in a variety of male reproductive disorders including possible declines in sperm concentration (Sharpe, 2001; Skakkebaek et al., 2001). Isoflavones are plant-derived polyphenolic compounds with estrogenic activity and are found mainly in soy beans and soy-derived products. They are generally considered to have a weak estrogenic activity, being able to bind estrogen receptor (ER) a

with an affinity 100–1000 times lower than estradiol (Miksicek, 1994; Kuiper et al., 1998; Song et al., 1999; Matthews et al., 2000; Branham et al., 2002; Harris et al., 2002).

Nevertheless, isoflavones have also been found to bind strongly to membrane ERs (Thomas and Dong, 2006) and to exert non-genomic actions potentially deleterious to male fertility (Fraser et al., 2006). In addition, isoflavones have been related to male reproductive disorders in mammals, including impaired development of reproductive organs, especially following intrauterine exposure (Atanassova et al., 2000).

Data on humans are scarce, however, and often inconsistent with the preponderance of animal data. Thus, whether consuming soy foods during adulthood could affect fertility in men is still an unresolved question. Here, we present a cross-sectional analysis relating soy food and isoflavone intake to semen quality parameters among men presenting for semen analysis at an infertility clinic in an academic medical center.

Materials and Methods

Male partners in subfertile couples who presented for evaluation at the Massachusetts General Hospital Fertility Center between 2000 and 2006 were invited to participate in an ongoing study of environmental factors and fertility (Hauser et al., 2006). Approximately 60% of eligible men agreed to participate. Men presenting for post-vasectomy semen analysis were not invited to participate.

The study was approved by the Human Subject Committees of the Harvard School of Public Health and the Massachusetts General Hospital, and informed consent was obtained from all participants.

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