Invited Commentary

Invited Commentary: The Association Between Marijuana Use and Male Reproductive Health

Michael L. Eisenberg*

* Correspondence to Dr. Michael L. Eisenberg, Department of Urology, Stanford University School of Medicine, 300 Pasteur Drive, Stanford, CA 94305-5118 (e-mail: eisenberg@stanford.edu).

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Approximately 15% of all couples are unable to conceive after a year and are labeled infertile, with a male factor identified in up to half of all cases (1–3). Investigators have continued to search for the etiology of impairments in male spermatogenesis with the hopes of improving fertility for impacted couples.

Several lifestyle factors have been associated with alterations in sperm production. Cigarette smoking, lack of physical activity, television watching, and certain diets have been associated with impaired semen quality (4–7). Body size has also been correlated with semen parameters, with increasing body mass index and adiposity associated with lower semen parameters (8, 9).

An increasingly common exposure with less data surrounding reproductive impact is marijuana use. As of this commentary, 4 states (Alaska, Colorado, Oregon, and Washington) and the District of Columbia have passed laws to legalize use of recreational marijuana for adults aged 21 years or older (10). Currently, over 40% of American men report having ever used marijuana, with approximately 25% of young men reporting use within the past month (11, 12). Thus, there are approximately 17.4 million current users of marijuana with 4.6 million using marijuana almost daily (13). Moreover, up to 22% of men who intended to have children (or more children) reported using marijuana within the past 12 months (14). As usage of marijuana may rise with further legalization, more information regarding the reproductive health impacts is needed. Prior reports examining the association between marijuana use and semen quality recruited men with a history of drug abuse or infertility, thus limiting generalizability of identified relationships (15–17).

The current study by Gundersen et al. (18) is one of the first to rigorously examine the association between marijuana use and semen quality in men from the general population. These authors take advantage of a unique opportunity that exists in Denmark. As a result of the military draft, all young men in the country are required to undergo a physical examination to determine suitability for military service after the completion of schooling. Beginning in 1996, the investigators have invited these young men to participate in a program to better understand the reproductive health of men in Denmark. Participants complete a questionnaire, give semen and blood

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Marijuana is and reproductive hormone levels. The active ingredient in marijuana and semen quality. Smoking marijuana showed minimal association between weekly marijuana usage, those with higher alcohol consumption had a low weekly alcohol usage displayed impairments with male reproduction. Although men who had a low weekly alcohol usage displayed impairments with weekly marijuana usage, those with higher alcohol consumption showed minimal association between smoking marijuana and semen quality.

The authors also explored the association of marijuana use and reproductive hormones. The active ingredient in marijuana is Δ⁹-tetrahydrocannabinol that binds to cannabinoid receptors in the brain and testis, implying both direct and indirect mechanisms whereby male reproduction could be affected. Although no differences in leutenizing hormone, follicle-stimulating hormone, or sex hormone-binding globulin levels were found, men with more than weekly marijuana usage had 7% higher testosterone levels.

Prior reports of the other health impacts of marijuana usage are extensive, while limited in male reproduction. Investigators have reported improved or minimal impact on pulmonary function in marijuana smokers followed for over 20 years. In addition, recent reports using data from the National Health and Nutrition Examination Survey (NHANES) suggest that marijuana users display improved insulin resistance, lower fasting insulin levels, smaller waist circumference, and lower prevalence of diabetes. Given the association with favorable health profiles, one could plausibly surmise no impact or even benefit from marijuana use on male reproductive function. Although a slight positive association was identified with testosterone, a negative association was identified with sperm production.

Denmark has a long history of exploring male reproduction. Although many of the investigators of the current report have published landmark studies on male reproductive health, the population is unique in the world. Recent longitudinal data suggest that median sperm concentration in Denmark is 48 million/mL, which is noticeably lower compared with other countries where systematic reviews report values of 73 million/mL. Moreover, up to 77% of Danish men have impaired semen quality. In addition, although approximately 1.5% of US births are attributed to in vitro fertilization, that number is 4.5% in Denmark. Certainly, prior reports from Denmark have informed the world of many conditions including male reproduction, but findings should also be confirmed in other populations.

It is also important to note that marijuana users were distinct in several ways from nonusers. Marijuana users reported higher rates of alcohol, caffeine, and tobacco use. Moreover, they had higher tobacco exposure in utero, stress, prevalence of sexually transmitted diseases, and use of recreational drugs, all of which are associated with impaired fertility. Indeed, a man’s health may impact sperm production. Although these factors were adjusted for in regression models, residual confounding may remain.

The current report provides important information for patients and providers regarding the negative association between marijuana use and semen quality. Usage more than once per week is associated with lower sperm concentration and total sperm counts, impairments which are made worse with the use of other recreational drugs. While the benefit of marijuana cessation on recovery is uncertain, further study of the impact of marijuana use on male reproductive health is warranted as more states explore marijuana legalization.

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Author affiliation: Departments of Urology and of Obstetrics and Gynecology, Stanford University School of Medicine, Stanford, California (Michael L. Eisenberg).

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REFERENCES


