Association between alcohol intake and menstrual cycle characteristics

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Introduction and background:

Infertility is among the common health problems in the Western world. Approximately 16% of European couples are experiencing difficulties trying to achieve a planned pregnancy. The remarkable decline in fertility rates in recent decades can largely be explained by social changes in desired family sizes and better contraceptive methods but may also in part be attributed to reduced fecundity, the biological capacity to reproduce. Irregular menstrual cycles are associated with longer waiting time to pregnancy and therefore an important health problem for women desiring to conceive. Thus, identification of environmental causes of abnormal menstrual cycle patterns may provide clues to the causes of infertility.

Alcohol consumption may affect female reproductive function in different ways. Several studies in rats and monkeys have demonstrated alcohol-induced disruptions of the reproductive system such as decreased steroid hormone levels, reduced ovarian weight, and amenorrhea. Also epidemiologic studies have examined the possible association between alcohol consumption and female fecundity. A large European multicentre study found a prolonged waiting time to pregnancy in women with a high intake of alcohol (more than 14 drinks per week), and also low levels of alcohol have been suggested to have a negative impact on female fecundity. But others do not find any association between moderate alcohol intake and waiting time to pregnancy. A study within the Danish National Birth Cohort (DNBC) found that moderate drinkers had slightly shorter waiting times than abstainers and that the association was most pronounced among women drinking wine. Thus, evidence about an association between alcohol consumption and female fecundity is still sparse and contradicting.

Menstrual cycle disturbances have been associated with several factors including: age, body mass index (BMI), smoking, extreme exercise, work stress, organic solvents and other chemical compounds. A few studies have considered the possible association between alcohol intake and the menstrual cycle. However, studies are small and much of the research involves studies of animals or alcoholic women. In female rats, acute alcohol exposure is found to disrupt the female hypothalamic-pituitary-gonadal (HPG) axis and to alter the secretion of gonadotrophins during the
estrous cycle. Possible mechanisms underlying alcohol’s disruption of the female cycle in rats is found to be a temporary elevation of estradiol and testosterone. In humans, Becker et al. reported that alcoholic women experienced higher frequencies of menstrual disturbance, such as higher variability, when compared to non-alcoholics. A study from 1984 involving 917 American women found that irregular or interrupted periods were increased in women who reported high levels of alcohol intake (6 or more drinks 5 or more days a week). A small study including 26 women found no evidence of menstrual cycle dysfunction or hormone abnormalities in occasional drinkers, while heavy drinkers had significant derangements of the menstrual cycle such as anovulation. In contrast, a recent small study comparing 20 women with a moderate alcohol intake with 16 healthy women found no effect of alcohol consumption on menstrual cycle.

Estradiol and progesterone are essential hormones controlling the menstrual cycle, and therefore, it is possible that substances disrupting their production/function may disturb menstrual cyclicity.

Hypothesis:
Consumption of alcohol is associated with altered menstrual cycle length and increased risk of irregular menstrual cycles, a pilot study.

Objective:
The main object is to investigate the association between alcohol consumption and menstrual cycle length and irregularities among Danish women participating in the Danish National Birth Cohort, thereby representing the largest study to examine the association so far.

Materials and methods:
Study design:
The study is based upon data from the DNBC in which a total of 92,719 pregnant women were enrolled during the years 1996-2003. The women were invited to the study by their general practitioner at the first antenatal care visit, which usually takes place shortly after recognition of the pregnancy. At the antenatal care visit the women received written information about the DNBC and was included as a participant in the cohort if she returned a signed informed consent. The participants provided information on exposures by means of a computer-assisted telephone interview.
scheduled in pregnancy week 12 or as soon as possible after that date. Detailed information on this cohort is described elsewhere 29.

Exposure to alcohol:
All women were at the interview asked about alcohol consumption before pregnancy. They were asked about the average weekly consumption of bottles of beer, glasses of wine and glasses of spirits respectively. The answers where recoded as none, less than one bottle/glass per week or the number of bottles/glasses per week.

Menstrual cycle characteristics (outcome):
The participants were asked about their menstrual cycle characteristics in the period before becoming pregnant using questionnaire. The women were asked if their menstruations were regular, in that sense they were able to predict the time of the next menstruation within one week of certainty. Thinking about the last menstruation before becoming pregnant, they were asked whether it was at the expected time and of the usual strength and duration. Further, they were asked of the number of days from the first day of one menstruation to the first day in the next. Women, who reported a difference of 7 days or more in cycle lengths between months, will be defined to have irregular cycles. Short cycles will be defined as 24 days or less, whereas long cycles will be 32 days or more based on the distribution of cycle length and fertility in relation to cycle length in prospective studies 5,30. All three menstrual disorders will be treated as separate outcomes and combined in one outcome if one or more are present.

Covariates:
Information on potential confounders such as age, body mass index (BMI), parity, physical exercise, stress, smoking, occupational status, chronic diseases and prior reproductive history was obtained from the interview. Furthermore, the women were asked about their age at first menstrual period.

Statistics:
Multiple logistic and linear regression analyses will be preformed to investigate the association between alcohol consumption and menstrual cycle length and regularity. Potential confounders will be taken into account.
**Ethics:**
The data collection is approved by the ethical committee in Denmark and the storage and use of data is registered at The Danish Data Protection Agency. All participants signed an informed consent before entering the study and no further contact to the participants is needed for this study.

**Perspectives:**
The study contributes to the limited knowledge about effects of alcohol consumption on menstrual disorders.

**Organization:**
The project will be carried out at the Department of Occupational Medicine, Aarhus University Hospital, from 20. February 2013 to 1. February 2014. The exposure and outcome data is already collected. Thus, data are ready for analysis as soon as permission from the steering committee at DNBC and the Danish Data Protection Agency is given.

Julie Lyngsø, medical student, Department of Occupational Medicine, Aarhus University Hospital, will be the project manager and perform the statistical analysis and draft the first version of the article under supervision of Gunnar Vase Toft, Associate Professor, PhD and Birgit Bjerre Høyer, MHSc, PhD-student from the Department of Occupational Medicine, Aarhus University Hospital as well as Cecilia Høst Ramlau-Hansen, Associate Professor, PhD and Jørn Olsen, Professor from the Department of Public Health, Section for Epidemiology, Aarhus University.
Reference List


