

## Alcohol consumption and fecundability: prospective Danish cohort study

Ellen M Mikkelsen,<sup>1</sup> Anders H Riis,<sup>1</sup> Lauren A Wise,<sup>2</sup> Elizabeth E Hatch,<sup>2</sup> Kenneth J Rothman,<sup>2,3</sup> Heidi T Cueto,<sup>1</sup> Henrik Toft Sørensen<sup>1,2</sup>

### ABSTRACT

#### OBJECTIVE

To investigate to what extent alcohol consumption affects female fecundability.

#### DESIGN

Prospective cohort study.

#### SETTING

Denmark, 1 June 2007 to 5 January 2016.

#### PARTICIPANTS

6120 female Danish residents, aged 21-45 years, in a stable relationship with a male partner, who were trying to conceive and not receiving fertility treatment.

#### MAIN OUTCOME MEASURES

Alcohol consumption was self reported as beer (330 mL bottles), red or white wine (120 mL glasses), dessert wine (50 mL glasses), and spirits (20 mL) and categorized in standard servings per week (none, 1-3, 4-7, 8-13, and ≥14). Participants contributed menstrual cycles at risk until the report of pregnancy, start of fertility treatment, loss to follow-up, or end of observation (maximum 12 menstrual cycles). A proportional probability regression model was used to estimate fecundability ratios (cycle specific probability of conception among exposed women divided by that among unexposed women).

#### RESULTS

4210 (69%) participants achieved a pregnancy during follow-up. Median alcohol intake was 2.0 (interquartile range 0-3.5) servings per week. Compared with no alcohol consumption, the adjusted fecundability ratios for alcohol consumption of 1-3, 4-7, 8-13, and ≥14 or more servings per week were 0.97 (95% confidence interval 0.91 to 1.03), 1.01 (0.93 to 1.10), 1.01 (0.87 to 1.16) and 0.82 (0.60 to 1.12), respectively. Compared with no alcohol intake, the adjusted fecundability ratios for women who consumed only wine (≥3 servings),

beer (≥3 servings), or spirits (≥2 servings) were 1.05 (0.91 to 1.21), 0.92 (0.65 to 1.29), and 0.85 (0.61 to 1.17), respectively. The data did not distinguish between regular and binge drinking, which may be important if large amounts of alcohol are consumed during the fertile window.

#### CONCLUSIONS

Consumption of less than 14 servings of alcohol per week seemed to have no discernible effect on fertility. No appreciable difference in fecundability was observed by level of consumption of beer and wine.

#### Introduction

For many women of reproductive age, alcohol consumption is an integral part of their lifestyle. In Denmark, more than 30% of women aged 16-34 years have a weekly intake of seven drinks or more, and 18.2% of American women aged 18-44 years engage in binge drinking (at least four drinks per episode) on average 3.2 times within 30 days.<sup>1,2</sup> Alcohol consumption of more than one drink a day during pregnancy has been associated with low birth weight, preterm birth, and fetal alcohol spectrum disorders.<sup>3,4</sup> Official guidelines in several countries recommend maximum alcohol intake of seven drinks a week for non-pregnant women in general and no alcohol intake for pregnant women and women trying to conceive.<sup>5,6</sup> Nonetheless, the extent to which alcohol consumption affects female fertility is unclear. Some studies have reported that low to moderate levels of alcohol consumption are associated with decreased fertility.<sup>7-11</sup> Others found either no association<sup>12-18</sup> or a positive association between moderate alcohol intake and fertility for men and women.<sup>19,20</sup> Wine may contain some healthful compounds, possibly accounting for the association between moderate consumption and beneficial effects on cardiovascular disease, diabetes, and osteoporosis.<sup>21</sup> Few studies have

Table 1 | Baseline characteristics of 6120 participants by level of alcohol consumption. Values are numbers (percentages) unless stated otherwise

Characteristic	Alcohol intake in servings per week				
	None	1-3	4-7	8-13	≥14
No of women	1848	2801	1120	276	75
Median (IQR) age, years	27.0 (25.0-31.0)	28.0 (26.0-31.0)	29.0 (26.0-32.0)	29.0 (26.0-31.0)	29.0 (26.0-33.0)
Median (IQR) partner's age, years	30.0 (27.0-33.0)	30.0 (27.0-34.0)	30.0 (28.0-34.0)	31.0 (28.0-33.0)	32.0 (29.0-35.0)
Irregular cycles	488 (26.4)	713 (25.5)	264 (23.6)	74 (27)	25 (33)
Median (IQR) cycle length, days	29.0 (28.0-31.0)	29.0 (28.0-32.0)	29.0 (28.0-31.0)	29.0 (28.0-31.0)	28.0 (28.0-31.0)
Parous, ever had live birth	705 (38.2)	955 (34.1)	319 (28.5)	59 (21)	17 (23)
Median (IQR) body mass index	23.2 (20.9-27.2)	22.9 (20.8-25.8)	22.6 (20.8-25.1)	22.8 (21.1-25.0)	22.2 (20.8-26.2)
Median (IQR) physical activity, MET hrs/week	29.5 (16.0-48.0)	29.7 (16.0-48.0)	32.0 (16.0-48.0)	31.9 (16.0-48.0)	32.0 (16.0-56.0)
Short vocational training (<3 years)	803 (43.5)	953 (34.0)	344 (30.7)	71 (26)	24 (32)
Current smoking	214 (11.6)	402 (14.4)	249 (22.2)	85 (31)	25 (33)
Caffeine consumption ≥150 g/day	417 (22.6)	1014 (36.2)	556 (49.6)	141 (51)	44 (59)
Mean (SD) pack years of smoking	1.5 (3.6)	1.6 (3.5)	1.9 (3.6)	2.3 (3.9)	4.5 (6.5)
Frequency of intercourse ≥4 times/week	376 (20.4)	502 (17.9)	194 (17.3)	63 (23)	15 (20)
No timing of intercourse	737 (39.9)	1232 (44.0)	561 (50.1)	149 (54)	40 (53)
Attempt time before study entry:					
0-1 cycles	960 (52.0)	1478 (52.8)	643 (57.4)	160 (58)	45 (60)
2-3 cycles	519 (28.1)	746 (26.6)	272 (24.3)	66 (24)	17 (23)
4-6 cycles	369 (20.0)	577 (20.6)	205 (18.3)	50 (18)	13 (17)
History of sexually transmitted infection	557 (30.1)	876 (31.3)	394 (35.2)	94 (34)	27 (36)

IQR=interquartile range; MET=total metabolic equivalents.

### Quesiti (probabilità)

1. Supponiamo di scegliere a caso una donna, qual è la probabilità che non beva alcool?
2. Se scegliamo una donna a caso, qual è la probabilità che non beva alcool né fumi?
3. Tra le donne che fumano, qual è la probabilità di non bere alcool?
4. Qual è la probabilità di bere più di 8 «bicchieri» a settimana?
5. Qual è la probabilità di bere più di 8 «bicchieri» a settimana tra le fumatrici?

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### Quesiti

1. Supponiamo di scegliere a caso una donna, qual è la probabilità che non beva alcool?  $1848/6120=0.302$
2. Se scegliamo una donna a caso, qual è la probabilità che non beva alcool né fumi?  
 $(1848-214)/6120=0.267$   
 $oppure P(\text{NoAlcool})P(\text{NoFumo|NoAlcool})=1848/6120*((1848-214)/1848)=0.302*0.884=0.267$
3. Tra le donne che fumano, qual è la probabilità di non bere alcool?  
 $214/975=0.219$
4. Qual è la probabilità di bere più di 8 «bicchieri» a settimana?  
 $(276+75)/6120=0.057$
5. Qual è la probabilità di bere più di 8 «bicchieri» a settimana tra le fumatrici?  
 $(85+25)/975=0.113$

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### Quesiti (descrittiva)

1. Qual è l'età mediana delle donne che non bevono alcool?
2. Confrontare l'età mediana delle donne e dei loro partner
3. Tra le donne del campione che bevono tra 1 e 3 «bicchieri» di alcool al giorno ci sono donne con età inferiore a 26 anni? Se sì, che frequenza hanno?
4. Quale delle seguenti affermazioni non è corretta:
  - a. «Il 50% delle donne che non assumono alcool ha meno di 27 anni»
  - b. «Il 25% delle donne che non assumono alcool ha più di 25 anni»
  - c. «Il 50% delle donne che non assumono alcool ha tra i 25 e i 31 anni»
  - d. «Il 25% delle donne che non assumono alcool ha più di 31 anni»
  - e. «Il 75% delle donne che non assumono alcool ha meno di 31 anni»

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6120

#### Quesiti

1. Qual è l'età mediana delle donne che non bevono alcool? 27 anni
2. Confrontare l'età mediana delle donne e dei loro partners. le donne hanno un'età inferiore rispetto ai partners
3. Tra le donne del campione che bevono tra 1 e 3 «bicchieri» di alcool al giorno ci sono donne con età inferiore a 26 anni? Se sì, che frequenza hanno? Sì, sono il 25% delle donne che bevono tra 1 e 3 «bicchieri» (quindi circa 700)
4. Quale delle seguenti affermazioni non è corretta:
  - a. «Il 50% delle donne che non assumono alcool ha meno di 27 anni»
  - b. «Il 25% delle donne che non assumono alcool ha più di 25 anni»
  - c. «Il 50% delle donne che non assumono alcool ha tra i 25 e i 31 anni»
  - d. «Il 25% delle donne che non assumono alcool ha più di 31 anni»
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La risposta b non è corretta