Asking about quantity and frequency of alcohol consumption before asking the CAGE questions produces lower ratings on the CAGE test

Jean-François Etter

Institute of social and preventive medicine, University of Geneva, CMU, 1 rue Michel-Servet, CH-1211 Geneva 4, Switzerland

Received 2 September 2003; accepted 16 December 2003

Abstract

Background: We tested whether asking about alcohol consumption before asking the CAGE questions modified the answers to the CAGE test.

Methods: Randomized trial on a smoking cessation website, in English, in 2003. Half the participants began by answering questions on quantity and frequency of alcohol consumption and then, on a second web page, answered the CAGE questionnaire (format A). The other half answered first the CAGE and then questions on quantity and frequency (format B).

Results: The survey was answered by 1213 people. Fewer people gave positive answers to three of the four CAGE questions in format A than in format B. Cut-down, 32% versus 38% (P = 0.01); annoyed, 13% versus 18% (P = 0.02); eye-opener, 5% versus 8% (P = 0.02). Fewer people had a CAGE score ≥2, indicating possible alcoholism, in format A than in format B (26% versus 32%, P = 0.04). This effect was stronger in men (CAGE ≥2, format A, 29%; format B, 39%; P = 0.03), and it was not statistically significant in women (CAGE ≥2, format A, 25%; format B, 28%; P = 0.4).

Conclusion: In an internet survey, asking questions about the quantity and frequency of alcohol consumption before asking the CAGE questionnaire produced fewer positive answers to the CAGE. This effect was observed only in men.

© 2004 Elsevier Ireland Ltd. All rights reserved.

Keywords: Alcohol consumption; CAGE test; Internet survey

1. Introduction

Denial is a recognized component of alcohol abuse and dependence (Duffy, 1995). As a consequence of denial and underreporting, alcohol abuse may remain undiagnosed. Undetected alcoholism may lead to inappropriate diagnosis and treatment, and to prolonged medical and social adverse effects of alcoholism. One way to improve the identification of alcohol abuse is to use a screening test, and routine alcohol screening for all primary care patients is recommended by guidelines (US Preventive Services Task Force, 1996). Self-administered questionnaires are particularly suitable for screening because of their brevity and ease of use. In addition, completion of a brief questionnaire may be perceived as less threatening than answering directly questions on alcohol consumption or alcohol-related problems.

The CAGE questionnaire is one of the most widely used screening tests for alcohol abuse (Ewing and Rouse, 1970; Ewing, 1984; Mayfield et al., 1974). The CAGE test is an appropriate screening tool for alcoholism in the general population and in primary care outpatients, with high sensitivity and specificity, compared to DSM-III-R criteria (Chan et al., 1994). This questionnaire consists of four questions of a nonincriminating nature (Table 1), and it is designed to be a reliable indicator of hidden alcoholism. The CAGE is shorter than most similar questionnaires, and it was specifically designed to avoid under-reporting due to denial.

It has been recommended to avoid asking patients about the quantity and frequency of their alcohol consumption before asking the CAGE questions, in order to avoid denial (Sokol et al., 1992). In bedside interviews conducted by a physician in patients with probable alcoholism (all had MAST scores ≥4), asking questions on the quantity and frequency of alcohol consumption before asking the CAGE questions decreased substantially the proportion of people who had a CAGE score ≥2 (7%), compared to asking the CAGE questions without asking first about alcohol consumption (20% with CAGE ≥2, P = 0.0001) (Steinweg and Worth, 1993). In this sample, which consisted of a
Table 1

CAGE test and alcohol consumption, for two questionnaire formats that appeared alternatively in random order, on a website dedicated to smoking cessation, 2003

<table>
<thead>
<tr>
<th>Format</th>
<th>Format</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>P-value</td>
</tr>
<tr>
<td>CAGE test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you ever felt you should cut down on your drinking? (Yes, %)</td>
<td>31.5</td>
<td>38.4</td>
</tr>
<tr>
<td>Have people annoyed you by criticizing your drinking? (Yes, %)</td>
<td>13.0</td>
<td>18.2</td>
</tr>
<tr>
<td>Have you ever felt bad or guilty about your drinking? (Yes, %)</td>
<td>28.1</td>
<td>31.6</td>
</tr>
<tr>
<td>Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover? (Yes, %)</td>
<td>4.7</td>
<td>8.1</td>
</tr>
<tr>
<td>CAGE ≥ one positive answers (%)</td>
<td>37.1</td>
<td>43.6</td>
</tr>
<tr>
<td>CAGE ≥ two positive answers (%)</td>
<td>26.2</td>
<td>31.7</td>
</tr>
<tr>
<td>CAGE ≥ three positive answers (%)</td>
<td>11.2</td>
<td>15.8</td>
</tr>
<tr>
<td>CAGE ≥ four positive answers (%)</td>
<td>2.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Currently, how frequently do you drink alcohol? (including beer, wine or other spirits)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every day or almost (6–7 days per week)</td>
<td>12.8</td>
<td>13.2</td>
</tr>
<tr>
<td>Several times per week (3–5 days per week)</td>
<td>14.8</td>
<td>15.4</td>
</tr>
<tr>
<td>One to two times per week</td>
<td>27.5</td>
<td>25.1</td>
</tr>
<tr>
<td>One to three times per month</td>
<td>18.9</td>
<td>20.7</td>
</tr>
<tr>
<td>Less than once per month</td>
<td>14.8</td>
<td>16.2</td>
</tr>
<tr>
<td>Never</td>
<td>10.2</td>
<td>9.4</td>
</tr>
<tr>
<td>On the days when you drink alcohol, how many glasses of beer, wine and/or other spirits do you drink per day, on average?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Median</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Glasses of alcohol per week (product of the two questions above, see Section 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Median</td>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Format A: first questions on quantity and frequency of alcohol use, then CAGE test. Format B: first CAGE test, then questions on quantity and frequency of alcohol use.

Most of the men (83%) of men, almost all alcoholics were correctly identified when the CAGE was asked first, but two thirds of alcoholics were missed when the CAGE was preceded by questions on alcohol consumption (Steinweg and Worth, 1993). The presence of the physician may have exerted an inhibitory force, which may explain these results. But we know of no report of this effect when the CAGE test is self-administered, outside a medical setting, in patients with no prior suspicion of alcoholism.

Our aim was to test the hypothesis that when the CAGE test is self-administered over the internet, fewer people will give positive answers to the CAGE questions when they are first asked to indicate the quantity and frequency of their alcohol consumption, compared to people who answer the CAGE test without being asked about their alcohol consumption.

2. Methods

2.1. Setting and population

Data were collected between June and August 2003 on http://www.Stop-tabac.ch, a website dedicated to smoking cessation, available in English, Danish, French, Italian and German. Visitors of this website consist mainly of smokers who want to quit smoking and of recent ex-smokers (Etter and Perneger, 2001a; Etter et al., 2003). An invitation to answer the survey (in English) was sent by e-mail in June 2003 to 12,014 smokers and ex-smokers who took part in the Danish and English versions of the interactive smoking cessation program available on this website, and who agreed to be contacted again by us (Etter and Perneger, 2001b). A link to the questionnaire was also placed on several pages of this website during 8 weeks. Participants were invited to answer a few questions on alcohol and tobacco consumption. We stored the computer number of each participant, in order to identify duplicate records.

2.2. Design

This was a randomized, controlled trial. Two formats of the same questionnaire appeared randomly on the screen. In format A, a first page asked about demographics and quantity and frequency of alcohol consumption (Table 1). At the bottom of this page, participants clicked on a button labelled “Next part”, and the CAGE questionnaire appeared in a new page. In format B, participants answered...
first demographics and CAGE, and then, on a new page, questions on the quantity and frequency of their alcohol consumption.

2.3. Statistical analyses

We computed weekly alcohol consumption, multiplying the number of drinks (assessed by the question—“on the days when you drink alcohol, how many glasses of beer, wine and/or other spirits do you drink per day, on average?”), by the frequency of alcohol consumption, assess by the question—“currently, how frequently do you drink alcohol? (including beer, wine or other spirits)”. Answers were coded as follows—“every day or almost (6–7 days per week)” coded 6.5, “several times per week (3–5 days per week)” coded 4, “one to two times per week” coded 1.5, “one to three times per month” coded 0.5, “less than once per month” coded 0.1, “never” coded 0.

We used chi-square tests to compare proportions, t-test to compare means and Mann–Whitney U-tests to compare medians.

3. Results

3.1. Participation

The raw database included 1229 records. We deleted 16 duplicate records, and the analysis was based on the remaining 1213 participants (10% of 12,014).

Participants were mainly women (64%), they were on average 40-years-old (quartiles 31, 39 and 47 years), 50% were daily smokers, 7% occasional (not daily) smokers, 42% were ex-smokers and 1% had never been smokers. Daily smokers smoked a median of 18 cigarettes per day, and they smoked their first cigarette of the day a median of 15 min after waking up. Participants lived in Denmark (41%), the United States (28%), the United Kingdom (5%), Canada (5%), Switzerland (2%) and other countries (21%).

Half the participants answered each of formats A (n = 611) and B (n = 602). There was no statistically significant difference between participants in the two formats in terms of age, sex, country of residence, smoking status, number of cigarettes smoked per day and minutes before smoking one’s first cigarette of the day.

4. CAGE

Fewer people gave positive answers to three of the four CAGE questions in format A than in format B (Table 1). Fewer people used a CAGE score ≥2, indicating possible alcoholism, in format A than in format B, and fewer people in format A had a CAGE score ≥1, suggesting the need of special attention from a physician (Ewing, 1998). The mean CAGE score was 0.77 in format A and 0.96 in format B (P = 0.01). The differences between answers to format A versus format B were larger in men than in women, and they were not statistically significant in women.

In the 99 participants who drank more than six glasses of alcohol on a given day, 38% had a CAGE score ≥2 in format A and 53% in format B (P = 0.14). In the 165 heavy drinkers who drank more than 14 glasses per week (Bradley et al., 1998), 66% had a CAGE score ≥2 in format A and 73% in format B (P = 0.31).

4.1. Alcohol consumption

There was no difference between format A and B in the quantity or frequency of alcohol consumption (Table 1).

5. Discussion

When the CAGE test was self-administered over the internet, asking about the quantity and frequency of alcohol consumption before asking the CAGE questions produced fewer positive answers to the CAGE. This effect was particularly large in men, as there were 10% fewer men with a CAGE ≥ 2 in format A than in format B. At a population level, this translates in large numbers of men with probable alcoholism who may remain undetected when the survey is self-administered, for instance in large population surveys. This could result in a substantial under-estimation of the need for medical resources.

Even when the analysis was restricted to men, the effect was smaller in this internet survey than in a bedside interview conducted by a physician in patients with probable alcoholism (Steinweg and Worth, 1993). It is possible that the presence of the physician caused most of the effect observed in this prior study. In the present self-administered internet survey, the effect of asking about quantity and frequency was not due to the fear of a negative judgement from a physician or an interviewer. Rather, asking about alcohol consumption may have produced a reaction of denial, as if some people said to themselves—“it is true that I drink too much, but this does not create any problem”. The only prior randomized trial on the same topic included only seven women (Steinweg and Worth, 1993). Thus, this is the first study showing that asking about alcohol use produces fewer positive answers to the CAGE test only in men, but not in women.

Analyzing the performance of the CAGE test is mainly relevant in people who drink too much. In participants who drank more than six glasses of alcohol on a given day, or in heavy drinkers who drank more than 14 drinks per week, the differences in CAGE scores between groups A and B were in the same direction as in the whole sample, but they were not statistically significant, probably because of the small size of these subsamples. Thus the observed effect was apparently not limited to moderate drinkers.
Because we had no gold standard to assess alcohol dependence, we do not know which of format A or format B produced the most accurate estimation of alcoholism. However, a prior study conducted in a clinical setting showed that asking questions on quantity and frequency of alcohol consumption before asking the CAGE substantially decreased the sensitivity of the CAGE (sensitivity = 32% instead of 95% when patients were not asked to quantify their alcohol consumption) (Steinweg and Worth, 1993). Thus it is likely that even when the questionnaire is self-administered, asking participants to quantify their alcohol consumption decreases the sensitivity of the CAGE test.

5.1. Limitations of this study

This study was conducted in a self-selected sample of users of a smoking cessation website, thus current and former smokers were over-represented in the present survey. Compared to a representative sample of smokers in Geneva, smokers who visited this website were more motivated to quit smoking (23% versus 4% intended to quit smoking in the next month) and more likely to have made a quit attempt in the previous year (45% versus 30%) (Etter et al., 1997). The proportion of participants with CAGE ≥ 2 was higher in the present survey than in a representative sample of the Swiss population (8% among drinkers, Truan et al., 1997). Dual dependence on tobacco and alcohol is a well-known phenomenon (Soebell et al., 2002), and our website may have attracted people who suffered from dependence on both alcohol and tobacco.

In a previous study, we compared smokers self-recruited on the same website to smokers who took part in a mail survey (Etter and Perneger, 2001a). We showed that even though the distribution of smoking-related variables was different in the two samples, the strength of associations between variables, should be generalizable. In addition, participants in this study came from several countries, which increases the generalizability of our findings. We conclude that asking about the quantity and frequency of alcohol consumption before asking the CAGE questions produces fewer positive answers to the CAGE test.

Acknowledgements

The author is employed by the University of Geneva. The Stop-tabac.ch website, where data were collected, is supported by grants from the Geneva Health Administration, the Swiss Federal Office of Public Health, the Swiss Cancer League and the Danish Cancer League. Vincent Baujard, from the Health On The Net Foundation (www.hon.ch) developed the software for data collection.

References