HEAVY DRINKING OCCASIONS AND DEPRESSION

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Abstract — Aims: To assess the risk of depression for subjects with or without heavy drinking occasions after adjusting for the average long-term alcohol consumption, age, gender, marital status, employment status, and chronic diseases. Methods: In a cross-sectional population survey (N = 3124) carried out in Finland in 1997, long-term average alcohol consumption was assessed by a self-administered quantity-frequency questionnaire. A heavy drinking occasion was defined as six or more drinks for men and four or more drinks for women consumed at one session. The self-administered 21-item Beck Depression Inventory score of ≥10 was classified as clinically significant depression. Results: Ex-drinkers and subjects with heavy drinking occasions had more often clinically significant depression compared with lifelong abstainers and individuals without heavy drinking occasions. In addition to the drinking habit, the risk for clinically significant depression increased also with age. Men aged 45–64 years with heavy drinking occasions had 2.3 times higher risk for depression compared with young men (aged 25–34 years) without heavy drinking occasions. The respective risk for old women was 2.2 times higher. Conclusions: Drinking pattern with heavy drinking occasions is independently associated with clinically significant depression irrespective of average long-term alcohol consumption.

INTRODUCTION

Alcoholism and excessive alcohol consumption have been found to associate with depression both in clinical and population studies (Merikangas and Gelernter, 1990; Regier et al., 1990). The co-occurrence has been explained in separate theories suggesting either causal relation (Vaillant, 1993) or shared genetic and environmental determinants (Kendler et al., 1993) between depression and excessive alcohol consumption. However, even though the association of heavy alcohol consumption and depression has been widely studied both in community and clinical samples, there has been no particular focus on the alcohol drinking pattern. Most of the studies reporting findings about the association of alcohol consumption and depression in general population samples have assessed alcohol consumption in terms of average alcohol intake and have not considered alcohol drinking patterns. These studies assessing alcohol intake only by average consumption tend to oversimplify the picture by grouping drinkers with very different drinking patterns together. Individuals with alcohol consumption of 1–2 drinks per day are grouped together with individuals consuming 7–14 drinks in a single session once a week because both groups have the same average weekly alcohol intake. Alcohol drinking pattern has been found to be associated with mortality (Laatikainen et al., 2003; Rehm et al., 2003) and perceived health burdens (San Jose et al., 2000) independently of the average alcohol intake. These results suggest that the drinking pattern plays a role in relation to both objective and subjective health, probably through a variety of biological and psychosocial mechanisms.

It has been found that there is an association between withdrawal symptoms, usually observed after heavy drinking occasions, and lowered blood serotonin concentration levels (Pietraszek et al., 1991) accounting the neural basis of depression. This biological mechanism provides evidence for the hypothesis that drinking pattern with heavy drinking occasions may be associated with depression.

The purpose of the present population based cross-sectional study was to examine the differences in depressive symptom occurrence among ex-drinkers, lifelong teetotallers, and drinkers with or without heavy drinking occasions after adjusting for the average long-term alcohol consumption.

MATERIALS AND METHODS

Subjects

The study population consisted of a sub-sample of participants studied within the National FINRISK Study in the year 1997 (Vartiainen et al., 2000). A stratified random sample of people aged 25–64 years living in five geographically defined areas in Finland was drawn from the Finnish population register. The total sample size was 10 000 people. Stratification was made by sex and 10 year age groups. A psychosocial sub-sample included 6000 subjects. A self-administered questionnaire including questions on socio-economic factors, health behaviour, diseases and symptoms, and medical history was mailed to the subjects with an invitation to attend a health check. The psychosocial questionnaire including depression assessment was given to a sub-sample of participants after they had completed the health examination. Out of 4269 participants belonging to the sub-sample 3839 subjects (2068 women and 1771 men) returned the psychosocial questionnaire representing a total response rate of 64%. Data on depression and alcohol consumption were available for 3594 people. These subjects were used in analyses examining the association between drinking behaviour and depression (Table 1).

When assessing the association between alcohol drinking patterns and depression only those who reported alcohol consumption during the last year were included in analyses leading to a total of 3111 eligible subjects (1487 men and 1624 women) (Tables 2 and 3).

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Table 1. BDI mean-scores and proportions of respondents having BDI-score ≥ 10 by drinking groups

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Non-drinkers</th>
<th>Moderate drinkers (n = 2915)*</th>
<th>Heavy drinkers (n = 145)**</th>
<th>Hazardous drinkers (n = 153)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Men</td>
<td>7.6 (8.3)</td>
<td>34</td>
<td>11.8 (8.9)</td>
<td>52</td>
<td>7.1 (7.0)</td>
<td>28</td>
</tr>
<tr>
<td>Women</td>
<td>7.9 (7.1)</td>
<td>34</td>
<td>9.5 (8.4)</td>
<td>39</td>
<td>8.5 (7.6)</td>
<td>35</td>
</tr>
<tr>
<td>All</td>
<td>7.8 (7.5)</td>
<td>34</td>
<td>10.6 (8.7)</td>
<td>45</td>
<td>7.9 (7.4)</td>
<td>32</td>
</tr>
</tbody>
</table>

Pairwise contrast by drinking groups. Tukey mean separation test (P < 0.05 +++)

<table>
<thead>
<tr>
<th>Men</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
<th>Group 6</th>
<th>Group 7</th>
<th>Group 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>+++</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Group 2</td>
<td></td>
<td>+++</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Group 3</td>
<td></td>
<td></td>
<td>+++</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 4</td>
<td></td>
<td></td>
<td></td>
<td>+++</td>
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<td></td>
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<td></td>
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<tr>
<td>Group 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+++</td>
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<td></td>
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<tr>
<td>Group 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+++</td>
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<td></td>
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<tr>
<td>Group 7</td>
<td></td>
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<td></td>
<td></td>
<td>+++</td>
<td></td>
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<tr>
<td>Group 8</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>+++</td>
</tr>
</tbody>
</table>

Total N = 3594. For women there was no statistical difference between groups.

Group 1, lifelong teetotallers; Group 2, ex-drinkers; Group 3, no heavy drinking occasions; Group 4, heavy drinking occasions; Group 5, no heavy drinking occasions; Group 6, heavy drinking occasions; Group 7, no heavy drinking occasions; Group 8, heavy drinking occasions;

*, Total alcohol consumption 0–230 g/week for men and 0–150 g/week for women.

**, Total alcohol consumption 231–350 g/week for men and 151–210 g/week for women.

***, Total alcohol consumption >350 g/week for men and >210 g/week for women.
Table 2. Characteristics of participants by heavy drinking occasions

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Men (N = 1487)</th>
<th>Women (N = 1624)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heavy drinking occasions (N = 485)</td>
<td>No Heavy drinking occasions (N = 1002)</td>
</tr>
<tr>
<td>Depressive symptoms, BDI-score (SD)</td>
<td>9.1 (8.2)</td>
<td>7.0 (7.0)</td>
</tr>
<tr>
<td>Age, years (SD)</td>
<td>43.5 (10.8)</td>
<td>47.1 (11.0)</td>
</tr>
<tr>
<td>Total alcohol consumption g/week (SD)</td>
<td>204.0 (235.6)</td>
<td>77.6 (86.2)</td>
</tr>
<tr>
<td>Education, years (SD)</td>
<td>11.4 (3.9)</td>
<td>11.9 (3.8)</td>
</tr>
<tr>
<td>Married/cohabited (%)</td>
<td>66</td>
<td>81</td>
</tr>
<tr>
<td>Unemployed (%)*</td>
<td>31</td>
<td>19</td>
</tr>
<tr>
<td>Diseased (%)*</td>
<td>39</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS = statistically not significant.
* Values are frequencies (per cent). \( \chi^2 \)-test is used as a statistical test
** Values are means (SD). \( t \)-test is used as a statistical method.
*aUnemployed, temporary dismissal, under threat of unemployment
bFollowing diseases diagnosed by physician during the past 12 months: myocardial infarction, stroke, elevated blood pressure, heart failure, angina pectoris, cancer, bronchial asthma, emphysema/bronchitis, cholelithiasis, rheumatoid arthritis, other articular disease, back pain, chronic urinary track infection/nephritis.

Table 3. Odds ratios (95% CI) for depressive symptom score (BDI \( \geq 10 \)) by heavy drinking occasions and covariates

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Men (N = 1487)</th>
<th>Women (N = 1624)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Aged 25–44, no heavy drinking occasions</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Aged 25–44 with heavy drinking occasions</td>
<td>1.651  (1.161–2.347)</td>
<td>1.263 (0.868–1.838)</td>
</tr>
<tr>
<td>Aged 45–64, no heavy drinking occasions</td>
<td>1.684 (1.258–2.269)</td>
<td>1.523 (1.108–2.104)</td>
</tr>
<tr>
<td>Total alcohol consumption/10 g*</td>
<td>1.001 (1.000–1.002)</td>
<td>1.000</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/cohabited</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Single/separated/divorced/widowed</td>
<td>1.649 (1.264–2.147)</td>
<td>1.417 (1.124–1.786)</td>
</tr>
<tr>
<td>Chronic disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>One or more</td>
<td>1.714 (1.349–2.181)</td>
<td>1.726 (1.388–2.147)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed/parental leave/retired</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1.552 (1.188–2.023)</td>
<td>1.245 (0.968–1.599)</td>
</tr>
<tr>
<td>Education/year*</td>
<td>1.002 (0.970–1.034)</td>
<td>0.960 (0.930–0.992)</td>
</tr>
</tbody>
</table>

Model 1, Combined variable of age and drinking habit; Model 2, Model 1 + all controlled variables.
* Continuous variable.

Alcohol intake

Long-term average alcohol consumption was assessed by a self-administered questionnaire inquiring into the usual quantity and frequency of consumption during the past 12 months before the study resulting in eight drinking categories: lifelong teetotallers (\( N = 247 \)), ex-drinkers (\( N = 134 \)), moderate drinkers with (\( N = 580 \)) and without (\( N = 2335 \)) heavy drinking occasions, heavy drinkers with (\( N = 75 \)) and without (\( N = 70 \)) heavy drinking occasions, and hazardous drinkers with (\( N = 113 \)) and without (\( N = 40 \)) heavy drinking occasions. Consumption was assessed separately for beer, wine, and spirits by using the following questions: ‘How often do you usually drink beer/wine/spirits?’ and ‘How much beer/wine/spirits do you usually drink at a time?’ Pure alcohol content per standard drink of alcoholic beverage was estimated to be 12.5 g for beer, 12.0 g for wine, and 12.0 g for spirits, and standard drink was estimated to contain 33 cl for beer, 12 cl for wine and 4 cl for spirits. Hazardous drinkers were defined as those consuming >350 g/week (28 drinks/week) for men and >210 g/week (18 drinks/week) for women, corresponding to the screening limits used in brief interventions to reduce alcohol intake (Ballesteros et al., 2004). Heavy drinkers were defined as those drinking below these limits but >230 g/week (21 drinks/week) for men and >150 g/week for women (14 drinks/week), corresponding to the lower screening limits in some other brief interventions, and the rest were defined as moderate drinkers (Ballesteros et al., 2004). The definition for a heavy drinking occasion was six or more drinks for men and four or more drinks for women consumed at a time. Thus the drinkers with heavy drinking occasions included heavy beer drinkers, heavy wine drinkers, heavy spirits drinkers, and a mixed group, the last group included individuals consuming six or more drinks for men and four or more drinks for women of more than one beverage type at a time. The self-administered questionnaire did not allow us to identify those drinkers whose consumption reached the level of six or more drinks for men and four or more drinks for women only if the number of beer, wine, and spirits imbibed at a single time were summed up.

Depressive symptoms

The self-administered 21-item Beck Depression Inventory (BDI) (Beck et al., 1988, 1961) was used to assess depressive symptoms. Each item included four or five graded statements...
and the respondents were asked to choose one or more options corresponding most closely with his/her actual condition at that time. If there was more than one option chosen for a question, the option indicating the most severe depressive mood was chosen for further analyses. Each item had numerical values from 1 to 3 indicating the severity of depressive mood and the total BDI-score varied from 0 to 63. A respondent with total BDI-score 10 or more was classified as having clinically significant depression. This cut-off point was chosen because it is widely used both in clinical and population studies (Beck et al., 1988; Freedland et al., 2003).

**Pre-existing disease**

Respondents were classified to have a chronic disease if they reported one or more of the following diseases diagnosed by a physician: myocardial infarction, stroke, elevated blood pressure, heart failure, angina pectoris, cancer, asthma, emphysema/bronchitis, cholelithiasis, rheumatoid arthritis, other articular disease, back pain, or chronic urinary track infection/nephritis.

**Education**

Total years of education were used as a continuous variable to assess the education status.

**Statistical analyses**

Differences in means of BDI-score between the eight drinking groups were analysed pairwise using the Tukey mean separation test. The analyses were performed separately for men and women. These analyses were conducted for all subjects with data on depression and drinking behaviour, also for the non-drinkers.

The further analyses were performed only for those who reported to have consumed alcohol during the last year, to enable to assess the influence of alcohol drinking pattern after adjustment of the long-term average alcohol consumption.

The differences in background characteristics of the study participants with heavy drinking occasions and with no heavy drinking occasions were analysed with t-test and a $\chi^2$-test as appropriate.

Two and three-way interactions between heavy drinking occasions, gender, age, marital status, and major chronic diseases were tested using an analysis of variance model. Since a three-way interaction was found between gender, age, and drinking habit and a two-way interaction was detected between age and drinking habit among men, the data were further analysed by multivariate logistic regression separately for men and women and by modelling the interaction between age and drinking habit using a dummy variable resulting in four categories: young subjects with heavy drinking occasions, old subjects without heavy drinking occasions, old subjects with heavy drinking occasions, and young subjects without heavy drinking occasions. The last group was used as the reference category. The dependent variable was a high BDI-score (10 or more). Associations were adjusted for possible confounding factors: long term average alcohol consumption, marital status, employment status, chronic diseases, and education years. All analyses were performed using SAS (Statistical package, version 8.2 Cary, NC).

**RESULTS**

Un-adjusted BDI mean-scores and proportions of respondents with depressive symptoms according to drinking patterns are presented in Table 1. Lifelong teetotallers composed 6.9% of the study sample, ex-drinkers 3.7%, moderate drinkers 81.1%, heavy drinkers 4.0%, and hazardous drinkers 4.3%. The proportion of respondents with heavy drinking occasions was 20% of the moderate drinkers, 52% of the heavy drinkers, and 74% of the hazardous drinkers.

The difference in the prevalence of depressive symptoms was similar between different drinking groups both for men and women, though the BDI mean-score differences were statistically not significant for women. For men the difference was statistically significant; ex-drinkers and drinkers with heavy drinking occasions reported more depressive symptoms compared with the other groups.

Out of all respondents 24% reported a drinking habit with heavy drinking occasions. The number was 33% of men and 17% of women. Men and women with heavy drinking occasions reported more depressive symptoms, they were younger, they consumed on average significantly more alcohol, they were less frequently married/cohabiting, and more often unemployed than respondents without heavy drinking occasions. Men with heavy drinking occasions were less educated, whereas the difference was statistically not significant among women. There was no difference in pre-existing chronic disease occurrence in either gender (Table 2).

The risk for clinically significant depression for young men with heavy drinking occasions was not significantly increased compared with young men without heavy drinking occasions, whereas the risk was notably increased for old men whether or not they had a drinking habit with heavy drinking occasions. The risk for clinically significant depression for old men without heavy drinking occasions was 1.5 times higher and for old men with heavy drinking occasions 2.3 times higher compared with the reference group after adjustment for long term average alcohol consumption, marital status, chronic diseases, employment status, and education years (Table 3).

For women the risk for clinically significant depression was significantly increased both by heavy drinking occasions and age, being 1.6 times higher for young women with heavy drinking occasions, 1.7 times higher for old women without heavy drinking occasions, and 1.9 times higher for old women with heavy drinking occasions compared with the young women without heavy drinking occasions after adjustment for all variables (Table 3).

**DISCUSSION**

In this cross-sectional population study, we found that ex-drinkers and individuals with heavy drinking occasions had more often clinically significant depression compared with lifelong abstainers and individuals without heavy drinking occasions. In addition to the drinking habit, the risk for clinically significant depression increased also by age meaning, that old men and women with a drinking habit with heavy drinking occasions had the highest risk for depressive symptoms compared with the reference group. In this study, there was no statistically significant risk for depression for young men with...
heavy drinking occasions after adjustment for the long-term average alcohol consumption.

The association found between excessive alcohol consumption and depressive symptoms has been illustrated in various earlier clinical and population studies (Merikangas and Gelernter, 1990; Regier et al., 1990). A large American study (Epidemiologic Catchment area study, ECA) involving >20,000 adults, found that 37% of those with an alcohol disorder suffered some other mental disorder. The most prevalent mental disorders occurring with alcohol disorders were affective-, anxiety-, and antisocial-personality disorder (Regier et al., 1990). Another epidemiological study detected a 2- to 3-fold risk for anxiety and depressive disorders for individuals with alcohol abuse or dependency (Swendsen et al., 1998). One population study found an association between depression and increased quantity of alcohol consumed per typical drinking occasion, whereas the frequency of drinking was not related to depression (Parker et al., 1987). However, long-term average alcohol consumption was not adjusted for in that study.

Even though the co-occurrence of excessive alcohol consumption and depression has been frequently reported, the nature of association and the primary-secondary distinction based on chronological categorization are not clearly understood and at least three different theories have been used to account for the co-occurrence. Two of these theories suggest that heavy alcohol use and depression are causally related (Vaillant, 1993), whereas one theory proposed, that co-occurrence is due to shared genetic or environmental determinants (Kendler et al., 1993, 1995; Lin et al., 1996). Furthermore, the sequence of onset of alcoholism and depression has been found to differ by sex. The Epidemiologic Catchment Area Study found that in men, alcoholism preceded the onset of depression in 78% of the cases, whereas in women depression was the initial diagnosis in 66% of cases (Helzer and Pryzbeck, 1988). The causal pattern of association between heavy alcohol consumption and depression has been investigated in a few large longitudinal general population studies. One longitudinal study showed that alcohol use was followed by alleviation of depression in the short term, but worsened the symptoms in the long term. Likewise, a shorter-term impact of depression was found to increase alcohol consumption, whereas the long-term effect was in the opposite direction (Aneshensel and Huba, 1983).

In addition to the association found between drinking habit with heavy drinking occasions and depression, there was an association between ex-drinkers and depressive symptoms found in this present study. The association was not found for lifelong teetotallers, resulting in heterogeneous depressive symptom occurrence among the non-drinker group. There are studies demonstrating a relationship with non-drinking behaviour and psychological distress, revealing that non-drinkers have poorer mental health compared with moderate drinkers (Fillmore et al., 1998; Power et al., 1998; Caldwell et al., 2002), often illustrated as a U- or J-shaped relationship between alcohol consumption and psychological distress (Power et al., 1998; Rodgers et al., 2000b). These findings are consistent with the findings in this present study when one considers only ex-drinkers, but are not true here for lifelong teetotallers. The better psychological and physical health associated with moderate alcohol consumption has been explained by a tendency of past problem drinkers to become non-drinkers. However, the findings about the increased level of distress among non-drinkers have been inconsistent. The ‘sick-quitter’ hypothesis was tested in a British sample, where the U-shaped association between alcohol consumption, psychological distress, poor health, and limiting illness remained after exclusion of individuals with past drinking problems or heavy drinking patterns (Power et al., 1998).

Limitations

The present study is a cross-sectional study and therefore no primary-secondary distinctions between heavy drinking occasions and depressive symptoms can be made. However, the previous longitudinal studies have indicated that the sequence of onset of alcoholism and depression differs by sex (Helzer and Pryzbeck, 1988) suggesting that alcoholism usually precedes the onset of depression in men, whereas in women depression is the preceding diagnosis in most of cases (Helzer and Pryzbeck, 1988). A second limitation of this study is that the self-reported data on average alcohol intake are usually underestimates. (Alanko, 1984; Simpura, 1985; Duffy and Alanko, 1992). Underestimation has been found to be a consequence mainly of underreported drinking frequencies (Lemmens et al., 1992) probably because people tend to forget the light drinking sessions. Amounts of alcohol consumed at a single time are reported more accurately, thus resulting in more accurate estimates of heavy drinking occasions and thus a recall bias does not seem to be probable with respect to associations between heavy drinking occasions and depression.

A third limitation concerns the questionnaire, which allowed us to identify only those subjects, whose alcohol consumption reached the threshold level of a heavy drinking occasion, defined as six or more standard drinks of the same beverage type consumed at a single time for men and four or more drinks for women. However, if there were men who consumed six or more drinks of different beverage types at a single occasion and correspondingly women who consumed four or more drinks of different beverage types at one time, they were classified into the group of drinkers with no heavy drinking pattern. This weakness probably dilutes the observed association between heavy drinking occasions and depression and thus the real association might be stronger.

The questionnaire did not allow us to identify the frequencies of heavy drinking occasions or the frequencies of intoxication periods perceived after heavy drinking occasions. Furthermore, the definition for a heavy drinking occasion, derived from the question ‘How much do you usually drink at a time?’, does not clearly define the time used for drinking at one occasion and thus is only a crude indicator of the maximal blood alcohol concentration level and the level of drunkenness, although it does refer to the quantity of beverage habitually consumed.

The risk for depressive symptoms was attenuated only slightly after adjustment for average long-term alcohol consumption, marital status, chronic diseases, employment status, and education years. Even though these controlled factors are considered to be risk factors both for heavy alcohol use and depression, there may be additional relevant factors for which we could not control. Stressful life-events and social support...
have been found to be related to alcohol drinking (Rodgers et al., 2000a; Sillaber and Henniger, 2004) though it is probable that these factors are closely related to marital status, employment status, and chronic diseases that were controlled. Bearing in mind these limitations, the strengths of this study lie in the large general population sample allowing us to investigate alcohol drinking patterns and non-drinking behaviour and their associations to depressive symptoms after adjusting for the long-term total alcohol consumption.

Mechanisms

The higher scores of depressive symptoms among drinkers with heavy drinking occasions compared with those with the same average alcohol consumption without heavy drinking occasions may be attributable to withdrawal or hangover periods usually observed after heavy drinking episodes. The depressive symptoms perceived after cessation of alcohol drinking have been found to associate with decreased serotonin blood concentration levels (Pietrasszek et al., 1991) accounting for the neural basis of depression. The course of depressive symptoms after a withdrawal period has been found to be of relatively short-term duration, where the depressive symptoms often disappear within the early detoxification period, usually within 4 weeks after cessation of drinking (Liappas et al., 2002). However, a history of past severe withdrawal periods and limited social support have been found to be related to prolonged depressive symptoms after a detoxification period (Brown and Schuckit, 1988) and may thus provide an explanation for the observed strong association between heavy drinking occasions and depression among older men and women in contrast to younger men with the same drinking habit. Assuming that people do not change their drinking habits over a long time period, old men and women with a drinking habit with heavy drinking occasions probably have a history of withdrawal symptoms and alcohol-related life problems, in contrast to younger men who might cope better with alcohol induced symptoms and whose social contacts might increase their tolerance to heavy alcohol drinking pattern.

CONCLUSIONS

This study suggests that heavy drinking occasions are risk factors for depressive symptoms independently of the total alcohol consumption. This result indicates that greater emphasis should be placed on the drinking pattern when counselling individuals on alcohol and its health-related consequences. The alcohol use disorders identification test (AUDIT) includes a question of frequency of heavy drinking occasions and that can be used in screening people with unfavourable drinking habits.

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