Role of alcohol in the Eastern European mortality crisis

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Multiple influences on health

Social structure
- Corruption
- Exclusion
- Mass privatisation

Social Environment
- Violence
- Inequalities
- Low cohesion

Work
- Unemployment
- Job stress

psychological
- Depressio

Health Behaviours
- Alcohol

Brain
- Neuro-endocrine and immune
- Cognition

Patho-physiological changes
- Organ impairment

Material factors
- Deprivation

Early Life
- Growing up in war (or 1950s)

Genes

Culture

Well-being
- Mortality
- Morbidity
Alcohol accounts for most of the large fluctuations in Russian mortality, and alcohol and tobacco account for the large difference in adult mortality between Russia and western Europe.

Zaridze et al, 2009

Alcohol is a strong contributor to the health gap between western and central and eastern Europe.

Rehm et al, 2007

Almost half of all deaths in working age men in a typical Russian city may be accounted for by hazardous drinking.

Leon et al, 2007
Death rates in Russia 1980-2007
both genders, per 100,000

Gorbatchev elected
Coup against Gorbatchev, breakup of USSR
Rouble crisis

3M extra deaths (Men et al, 2003)
All cause mortality/100,000

Gorbachev’s antialcohol campaign
Collapse of the campaign
Collapse of the USSR

Temporal sequence

- **MEN**
  - Gorbatchev’s antialcohol campaign
  - Collapse of the campaign
  - Collapse of the USSR

- **WOMEN**

**Increased availability of cheap alcohol**
Annual rates of (proxy) alcohol consumption and homicides in Russia, 1965–1996.
Risk of CHD by alcohol consumption in 28 high quality cohort studies (Corrao et al 2000)

\[
\ln RR = 0.01110 (0.00070) \cdot alc - 0.09867 (0.00530) \cdot \sqrt{alc}
\]
Alcohol

• Western studies: cardio-protective effect
• but heavy drinking common in Russia
• Drinking pattern may be crucial:
  – High volume of drinking
  – Binge drinking
  – Surrogate / toxic alcohol
  – Drinking without meals
  – High concentration of ethanol?
  – Combination with other vulnerabilities?
High volume of drinking
Alcohol consumption by country, adults aged 15 and over, 2002, Europe

Source: WHO (2006). Health for All Database
Official recorded per capita consumption of pure alcohol (litres) per adult 15+ in 1996

From WHO 1999
Mean annual intake of alcohol (litres of ethanol)

Bobak et al, 2004
RR of death from all causes by alcohol intake in the last week in St Petesburg (Russia) and US men

From Deev et al, 1998
Global Burden of Disease: hazardous drinking patterns score

- ranging from 1 (lowest risk) to 4 (highest risk)
- combines scores in six dimensions:
  - high quantities of drinking per occasion;
  - frequency of getting drunk;
  - festive drinking being common;
  - drinking in public places being common;
  - drinking with meals being uncommon
  - and low rate of daily drinking.
- In principle, the score measures not the overall rate of hazardous drinking, but the degree of hazard associated with each extra per capita litre of alcohol consumed.
# Hazardous drinking patterns scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Countries (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (low risk)</td>
<td>Austria, France, Germany, Italy, Netherlands, Portugal, Spain</td>
</tr>
<tr>
<td>2</td>
<td>Australia, Canada, Denmark, Greece, <strong>Czech R</strong>, UK, USA</td>
</tr>
<tr>
<td>3</td>
<td>Finland, Iceland, Ireland, Norway, Sweden, <strong>Hungary</strong>, <strong>Poland</strong>, Lithuania</td>
</tr>
<tr>
<td>4 (high risk)</td>
<td>Belarus, Kazakhstan, Mexico, <strong>Russia</strong></td>
</tr>
</tbody>
</table>

Rehm et al 2003
GBD methodology used in CEE

- Exposure data taken from surveys and per capita consumption records
- Mortality taken from the WHO databank.
- The risk relationships were taken from published meta-analyses and from the WHO Comparative Risk Assessment project.
- Alcohol exposure and relative risk information was combined to derive alcohol-attributable fractions for relevant causes of premature mortality.
Years of life lost due to premature alcohol-attributable mortality at ages 20–64 in 2002

Rehm et al 2007
Proportion (%) of deaths attributable to alcohol at ages 20-64, in 2002

Rehm et al 2007
Binge / episodic drinking
Mean intake of alcohol (g) per drinking session

Bobak et al, 2004
Prevalence of binge drinking at least once a month (%)

Bobak et al, 2004
Problem drinking (CAGE 2+, %)

Bobak et al, 2004
RR of CVD death by drinking frequency and mean dose per occasion in Novosibirsk men

From Malyutina et al, Lancet 2003
Relative risk of all cause mortality by drinking frequency and bingeing in Russian men (n=8616)

Adj. for age, smoking, calendar period of birth and relative

Nicholson et al, 2005
Surrogates / samogon
Samogon

- Home brew / moonshine
- Common in rural areas
- High concentration
- Impurities

- But recent chemical analysis did not suggest toxicity
Surrogate alcohol

- Surrogates = alcoholic products not intended for human consumptions
- Often technical spirits
- Mainly in urban centres
- May act differently
- Recent “epidemics” of toxic hepatitis
- Recent data suggest
  - About 7% prevalence in men
  - High relative risk
### Alcohol drinking pattern and all-cause mortality in Izhevsk study (Leon et al 2007)

<table>
<thead>
<tr>
<th>Category</th>
<th>Cases (n=1633)</th>
<th>Controls (n=1587)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstains</td>
<td>132</td>
<td>186</td>
<td>1.3 (1.0-1.7)</td>
</tr>
<tr>
<td>Beverage alcohols only, no problem drinking</td>
<td>585</td>
<td>1118</td>
<td>1.0 [ref]</td>
</tr>
<tr>
<td>Beverages alcohol only, problem drinking</td>
<td>152</td>
<td>85</td>
<td>3.0 (2.2-4.0)</td>
</tr>
<tr>
<td>Surrogates, no problem drinking</td>
<td>99</td>
<td>25</td>
<td>6.3 (4.0-10.0)</td>
</tr>
<tr>
<td>Surrogates, problem drinking</td>
<td>500</td>
<td>82</td>
<td>9.7 (7.5-12.6)</td>
</tr>
<tr>
<td>Difficult to answer</td>
<td>165</td>
<td>91</td>
<td>3.0 (2.3-4.0)</td>
</tr>
</tbody>
</table>
Mortality odds ratio for surrogate consumption in Izhevsk (yes/no) compared with changes in mortality by cause in Russia 1994/1991

Pearson r = 0.93

From Leon et al 2007
Case-control study by Zaridze et al

- Three Russian industrial cities, addresses of 60,416 residents who had died at ages 15–74 years in 1990–2001 were visited.
- For 48,557 (97%), the family gave proxy information on the decedents' past alcohol use.
- Cases (n=43,082) were those certified as dying from causes we judged beforehand might be substantially affected by alcohol or tobacco;
- controls were the other 5,475 decedents.
- Reference category:
  - usual weekly consumption always less than 0.5 half-litre bottles of vodka (or equivalent in total alcohol content) AND
  - maximum consumption of spirits in 1 day always less than 0.5 half-litre bottles.
Relative risks of death from selected diseases for drinking 3+ bottles of vodka per week

<table>
<thead>
<tr>
<th>Disease</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents / violence</td>
<td>5.9</td>
<td>9.3</td>
</tr>
<tr>
<td>Alcohol poisoning</td>
<td>21.7</td>
<td>75.2</td>
</tr>
<tr>
<td>CHD</td>
<td>3.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Respir. Cancers</td>
<td>3.5</td>
<td>2.2</td>
</tr>
<tr>
<td>TB</td>
<td>4.1</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Zaridze et al 2009
Mortality from all causes, from causes strongly related to alcohol, and from other causes in the Altay and Tomsk regions of Russia, 1990–2001

Zaridze et al 2009
Questions / caveats

- Men vs. women
- Short-term vs. long-term effects
- Cohort studies vs. case-control studies
- Trends in alcohol intake in individual based studies
- not consistent
- Why new increase in mortality after 1998?
- Biological mechanisms (CVD)
- Other (alternative & complementary) explanations
Men vs. women

• Relative changes in mortality were similar in men and women

• But women do not seem to drink (heavily)

• What kills the women?
Why not liver cirrhosis?
Short-term vs. long-term effects

- Many studies implicitly seek to explain short-term fluctuations ("crisis")
- Data on past short-term fluctuations often inadequate
- This leads to using designs suitable to study long-term effects
- Can these be used interchangeably? Do we study causes of fluctuations or reasons for long-term high mortality?

Cohort vs. case-control studies

- Cohort studies seem to produce smaller RRs
- Not reaching heavy drinkers?
- Recency of exposure?
- Biases in ca-co studies?

St Petersburg cohorts (BMJ 2003)
Trends in binge drinking and CVD mortality not consistent (e.g. Novosibirsk but also RLMS)

Novosibirsk MONICA samples

From Malyutina et al 2001
Mortality (per 1000) by weekly alcohol intake in St. Petersburg men in 1980s and 1990s

% drinking >150g/w: 19%                             15%

From Plavinski et al 2003
Why the increase after 1998?

(both genders, per 100,000, data from WHO)
Biological mechanisms (especially for CVD)

- In the HAPIEE study, binge / heavy drinking was NOT related to lipids or BP in dramatically different fashion than elsewhere.

- All effects acute?
- Arrhythmias?
- Toxicity?
Odds ratios of high BP by annual alcohol intake and binge drinking pattern in men in the HAPIEE study

Odds ratios of high BP by annual alcohol intake and binge drinking pattern in men in the HAPIEE study
Contribution of alcohol to social inequalities
HR of deaths, RLMS, post 1990

Unemployed Income DSM

Adj. 1
Adj. 1 + alcohol

Billingsley 2009
Educational differentials in mortality between 1980s and 1990s in St Petersburg men: No effect of adjustment for alcohol

From Plavinski et al 2003
Trends in survival in men by education (the relatives’ study): no effect of adjustment for alcohol

45 p20 = probability of living to 65 yrs when aged 20 yrs

Calendar year

University

Less than secondary
Conclusions

• Alcohol certainly played a role in the mortality crisis
• The quantification is debatable
• “Easy” explanation
• But why such an increase in countries with long history of heavy alcohol abuse?
Alcohol

Mortality
Multiple influences on health

- Social structure
  - Corruption
  - Exclusion
  - Mass privatisation
  - Violence
  - Inequalities
  - Low cohesion

- Social Environment
  - Work
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- Genes
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