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## Editorial

# Alcohol and Suicide in Eastern Europe

Suicide is one of the leading external causes of death in many countries and its burden is expected to be rising [1]. There are a number of possible reasons responsible for this including lessened social integration, increase in psychiatric disorders, alcohol and drug abuse [2,3]. Alcohol consumption and suicide rates in Eastern Europe (EE) are among the highest in the world [4]. In a number of studies using various designs alcohol consumption has been found to be important risk factors of suicide in EE [5-7]. The empirical literature provides evidence of an association between alcohol and suicide at the individual level in many EE nations [8]. Most of the evidence linking excessive drinking and suicide in EE is based on population data. Both longitudinal and cross-sectional aggregate-level studies usually report a significant and positive association between alcohol consumption and suicide [5,6,9].

Recent studies addressing the alcohol-suicide relationship at the aggregate level applied sophisticated statistical modeling technique developed by Box and Jenkins [10] often referred to as ARIMA (autoregressive integrated moving average) time-series analysis. This technique allows to minimize the risk of spurious correlation. Additional advantage of this approach is that ARIMA time-series analysis provides a base for comparing the relationship between alcohol and suicide across countries. In his time series analysis data for the period 1965-99 Nemtsov [11] has reported that a 1-litre increase in alcohol consumption is expected to increase suicide rates by 11.4% for total population (13.1% for men and 6.6% for women). A more recent update suggests that 1 litre increase in per capita consumption is associated with an increase in overall suicide rates of 7.2% (8% for male and 4.3% for female) [5].

Several studies highlighted a significant aggregate level association between alcohol and suicide in the former republics of Soviet Union. In his pioneering work Värnik and Wasserman [8] revealed positive and statistically significant association between alcohol consumption per capita and suicide rates in the former Soviet Slavic and Baltic republics between 1984 and 1992. Alcohol appeared to have a lower explanatory value for female suicides compared with male suicides [12]. In another study based on the Russian time series data between 1980 and 2005, Razvodovsky [13] found that overall alcohol consumption is significantly associated with both male and female suicides: a 1-litre increase in alcohol consumption would result in increase in suicide rate of 7.0% for male and 3.2% for female.

Additional support for the hypothesis that unfavorable mixture of higher overall level of alcohol consumption and binge drinking of spirits is a major risk factor for suicide mortality in Russia provides the results of time-series analysis focused on the relation between the sale of different alcoholic beverages and suicide rates. It was reported that vodka consumption as measured by sale was significantly associated with both male and female suicide rate: 1 litre changes in per capita vodka sale was associated with increase in suicide rates by 9.3% for men and by 6% for women [9]. Instead, the consumption of beer and wine were not associated with suicide rate. In his time-series analysis Landberg [5] showed a significant association between alcohol and suicide in 7 eastern European countries. Most importantly, he revealed that the sizes of the effects were stronger in spirits drinking countries with detrimental drinking pattern. It is important to point out, that the size of the bivariate association between alcohol and suicide for men in EE is substantially greater than for women. This means that alcohol-related suicide is mainly a male phenomenon.

Natural experiments, such as sudden and large changes in alcohol consumption level, provide an opportunity to test the efficacy of policy attempts to reduce the rate of alcohol-related problems in the population. This types of experiments are being used in the social epidemiology and allow rigorously evaluate the efficacy of public health interventions. Russia, due to its high overall level of consumption, hazardous drinking pattern and its high suicide rate, provides an important contextual setting for this type of analysis. During the last decades, Soviet and later Russian governments adopted a series of restrictive measures in an attempt to curb the alcohol-related burden. Gorbachev's anti-alcohol campaign in the 1985-1988 is the most well-known natural experiment in the field of alcohol policy.

In his study Nemtsov [11] examined trends in per capita alcohol consumption and suicide rate in Russia from 1965 to 1999 and found that the anti-alcohol campaign was accompanied by a substantial decline in suicide mortality: in 1984-1986 there was a drop of 39.1% (from 37.9 to 23.1 per 100.000 of population), while alcohol consumption decreased by 26.8% (from 14.2 to 10.5 litres). Most important, it was shown that the number of BAC-positive suicides sank by 55% (from 22.0 per 100.000 in 1984 to 9.9 per 100.000) between 1984 and 1986 [11].

There is strong evidence of a key role of alcohol in explaining of Russian suicide mortality crisis in the early-1990s. In his well design study Mäkinen [6] has reported that alcohol consumption was powerful predictor of suicide rates in "high-suicide, unequal sex distribution" group of Eastern Bloc countries (including Russia)

which experienced a large drop in suicide rates in 1985-89, especially for middle-age males, followed by a large general increase in 1989-93. This evidence supports the hypothesis that increase in alcohol consumption was the main determinant of suicide mortality crisis in Russia in the early-1990s.

In contemporary Russia, recognizing the central role of alcohol in the mortality crisis President Putin signed a law regulating production and sale of alcohol production in 2005 [11]. The law contained regulations aimed at controlling the volume and quality of alcohol products and requiring the registration of alcohol production and distribution facilities. In a recent study Predimore et al. [14] took advantage of this natural experiment to assess the impact on suicide mortality of a suite of Russian alcohol policies. They used autoregressive integrated moving average (ARIMA) interrupted time series techniques to model the effect of the alcohol policy on monthly male and female suicide counts between January 2000 and December 2010. They revealed that the alcohol policy in Russia led to a 9% reduction in male suicide mortality, meaning the policy was responsible for saving 4000 male lives annually that would otherwise have been lost to suicide.

Another piece of evidence suggesting close link between alcohol and suicide at the population level come from Slovenia. Recognizing the high level of alcohol-related problems, the Slovenian National Assembly passed new legislation in January 2003 that aimed to reduce alcohol-related harm by restricting alcohol's availability. The law established a minimum age of 18 years for drinking and purchasing alcoholic beverages and limited where and when alcohol can be purchased. There is evidence that this new alcohol policy have had an impact on suicide mortality. In particular, Pridemore and Snowden [7] assessed the effect of a national alcohol policy on suicide mortality using interrupted time-series techniques, and found that the implementation of alcohol policy was followed by an immediate and permanent reduction in male suicide mortality. More specifically, there was an immediate and permanent reduction of 3,6 male suicides per month, or approximately 10% of the pre-intervention average. In contrast, the new policy had not statistically significant effect on female suicides.

In a more recent study Zupanc et al. [15] reported that during the period before the implementation of the measures which limited the availability of alcohol in Slovenia, the BACs of BAC-positive suicide victims were higher than those tested in the period after the implementation of the act. This evidence suggests that legislation measures restricting alcohol availability may be an effective means of BAC reduction in BAC-positive suicide victims. Together with similar findings elsewhere, these results suggest an important role for public health interventions, including restrictive alcohol policy, in reducing alcohol-related suicide deaths.

Overall, the high level of alcohol consumption in combination with detrimental drinking pattern in the EE countries results in high level of alcohol-related suicides and strong association between alcohol consumption and suicide rates in EE. This evidence is in accordance with aggregate-level studies that show that the association between

alcohol consumption and suicide rates is stronger in EE countries compared to WE countries. Studies of natural experiments have also demonstrated a significant impact of alcohol consumption on suicide rate in EE. In particular, a fairly close aggregate-level match between alcohol consumption and suicide mortality during the Gorbachev's anti-alcohol campaigns may be use as evidence suggesting that alcohol is responsible for a substantial number of suicide deaths. This empirical evidence indicates that a restrictive alcohol policy can be considered as an effective measure of suicide prevention in countries where rates of both alcohol consumption and suicide are high. The studies also suggest that suicide rate in several EE nations in addition to overall level of consumption is related to the beverage preference and drinking pattern. Assuming that drinking spirits is usually associated with intoxication episodes, these findings provide additional evidence that drinking pattern is important determinant in the alcohol-suicide relationship in EE countries. These findings also support the hypothesis that the association between alcohol consumption and suicide rates in EE countries is stronger than in WE countries due to a more detrimental drinking pattern and preference of strong spirits. This compelling evidence have important policy implications suggesting that any attempts to reduce overall consumption should also be linked with efforts through differential taxation to shift beverage preference away from spirits.

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