

Research Article

The Effect of Structure of Alcohol Consumption on the Level of Alcohol-Related Problems in Russia

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Abstract

Aim: The aim of this work was to investigate the relationship between the structure of alcohol consumption and the level of alcohol-related problems in Russia.

Methods: A comparative analysis of structure of alcohol consumption and alcohol-related problems rate (mortality from acute alcohol poisoning and liver cirrhosis, incidence of alcoholic psychoses) in Russia between 1970 and 2015 was performed. To examine the relationship between the independent variables (share of different types of alcoholic beverages) and dependent variables (alcohol-related problems rates). A time series analysis (Spearman's correlation analysis, cross-correlation of "prewaitened" time series) was performed using the statistical package "Statistica 12. StatSoft".

Results: The results of time-series analysis revealed statistically significant relationship between the share of strong alcoholic beverages in the structure of alcohol consumption and fatal alcohol poisoning rate. The analysis also suggests a negative relationship between the share of beer in the structure of alcohol consumption and fatal alcohol poisonings.

Conclusion: These findings lend support for the hypothesis postulating that structure of alcohol consumption affects the alcohol-related problems rates.

Keywords: Alcohol; Alcohol-related problems; Russia; Structure of consumption

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Introduction

Alcohol is the main factor in the high rate of premature death in Russia [1-5]. According to the who report "Alcohol and health" published in 2018, the overall level of alcohol consumption (in terms of absolute alcohol) among the population over 15 years of age in Russia was 11.7 liters (18.7 liters for men and 5.8 for women), the prevalence of "heavy" episodic alcohol consumption was 35.2% (48.4 and 24.2% among men and women respectively), the prevalence of alcohol dependence among the population was 9.3% (16.5 and 3.3% among men and women respectively) [6].

An important aspect of the state alcohol policy is the monitoring of the alcohol situation, which is based on the dynamics of indirect indicators of alcohol problems [7]. Death from acute alcohol poisoning refers to acute alcohol problems, since it is the result of consuming large doses of alcohol over a short period of time [8]. For this reason, mortality from acute alcohol poisoning is considered an indicator of the level of alcohol-related problems in countries where the so-called "Northern" style of alcohol consumption prevails [8].

Since long-term systematic use of alcohol is one of the main causes of liver cirrhosis, mortality from this pathology belongs to the so-called chronic alcohol-related problems [9]. The use of the death rate from liver cirrhosis in epidemiological studies as an indicator of the level of chronic alcohol problems has become a common practice [3]. The incidence rate of alcohol psychosis is an alternative indicator in relation to the level of alcohol mortality, which allows monitoring the alcohol situation in the country [10].

Previous studies have shown that mortality from acute alcohol poisoning, liver cirrhosis and the incidence of alcohol psychosis in Russia is more closely related to the level of vodka consumption than to the overall level of alcohol consumption [11]. Based on these data, it can be assumed that the level of alcohol-related problems is determined not only by the overall level of alcohol consumption, but also by the structure of consumption.

Therefore, the purpose of this study was to study the relationship between the structure of alcohol consumption and the level of alcohol-related problems in Russia.

Materials and Methods

In a comparative aspect the structure of alcohol consumption (the proportion of different types of alcoholic beverages) and the level of alcohol-related problems (mortality from acute alcohol poisoning and liver cirrhosis, the incidence of alcoholic psychosis) in Russia in the period from 1970 to 2015 were studied.

The overall level of alcohol consumption was calculated using an indirect method based on the dynamics of the death rate from acute alcohol poisoning [12,13]. The share of strong alcohol in the consumption structure was calculated as the sum of the level of vodka sales and the level of unregistered alcohol consumption on the basis

that unrecorded alcohol is mainly represented by unlicensed vodka and moonshine [14].

The death rates from acute alcohol poisoning and cirrhosis of the liver, the incidence of alcoholic psychosis and (per 100.000 population), as well as the level of sales of various types of alcoholic beverages (in liters of absolute alcohol per capita) are obtained from official publications of Rosstat. Statistical data processing (descriptive statistics, Spearman correlation analysis, correlation analysis of “bleached” time series) was performed using the software package “Statistica 12. StatSoft”.

It should be noted that the analysis of time series has certain difficulties, since it can lead to the detection of a false correlation between them. In this regard the applied analysis of the time series assumes that the trend is excluded from it (bleaching) so that the remnants do not differ from the “white noise” process. In this paper the method of simple difference operators was used to remove the trend from the time series [10]. The next step was to study the relationship between the transformed time series using cross-correlation analysis.

Results

Throughout the period under review, strong alcohol dominated the consumption structure (Figure 1). In the 1970s and the first half of the 1980s, the share of strong alcohol in the structure of consumption was 71-75%. In the second half of the 1980s and the first half of the 1990s, this indicator grew reaching a peak in 1994 (91%), after which it began to decline. In the second half of the 1970s and the first half of the 1980s, the share of wine in the consumption structure was approximately 15%. In the first half of the 1990s this indicator declined, reaching the “bottom” in 1993 and then began to grow, but did not reach the level of the 1970s. The share of beer in the structure of alcohol consumption in the 1970s and the first half of the 1980s remained stable grew slightly in the second half of the 1980s, declined in the first half of the 1990s, reaching the “bottom” in 1994, after which it began to grow.

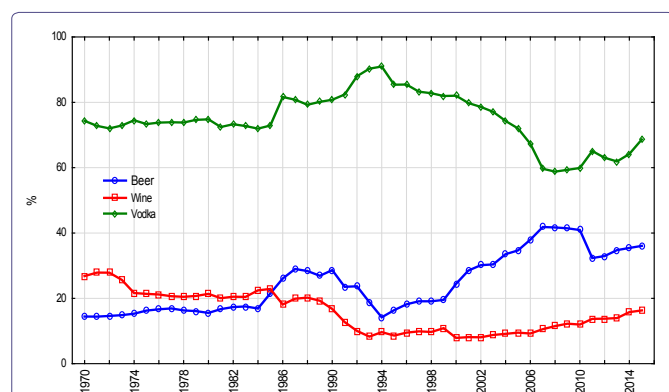


Figure 1: The structure of alcohol consumption in Russia in the period from 1970 to 2015.

The analysis of graphic data shows that the death rate from acute alcohol poisoning. Liver cirrhosis and the incidence of alcohol psychosis in the period under review was subject to significant fluctuations (Figure 2). The level of these indicators grew in the 1970s, declined significantly in the mid-1980s, then rose sharply in the mid-1990s, after which it began to decline. In the future, the dynamics

of these indicators differed significantly. Thus, the death rate from acute alcohol poisoning increased until 2003, after which it began to decline, while the death rate from cirrhosis of the liver increased until 2006. Reaching its peak for the entire period under review, after which there was a downward trend in the level of this indicator.



Figure 2: Dynamics of alcohol-related problems in Russia in the period from 1970 to 2015.

Using correlation analysis, a weak positive relationship between the specific weight of strong alcohol in the structure of alcohol consumption and the death rate from acute alcohol poisoning was established (Table 1). It was also found that the specific weight of wine in the structure of consumption negatively correlates with the level of alcohol problems. We also found a positive relationship between the specific weight of beer in the structure of alcohol consumption and the death rate from cirrhosis of the liver, as well as the incidence of alcohol psychosis.

Correlation analysis of “prewhitened” time series revealed a statistically significant relationship between the specific weight of strong alcohol in the structure of consumption and the death rate from acute alcohol poisoning (Table 1). It was also found that the share of beer in the structure of alcohol sales negatively correlates with the level of fatal alcohol poisoning. Correlation analysis of “prewhitened” time series did not confirm the existence of a negative relationship between the specific weight of wine in the structure of alcohol consumption and the level of alcohol problems.

Indicator	Correlational Analysis			Cross-Correlational Analysis		
	Vodka	Wine	Beer	Vodka	Wine	Beer
Alcohol poisoning	0.32*	-0.37*	-0.13	0.29*	-0.07	-0.34*
Liver cirrhosis	-0.29	-0.54*	0.70	-0.19	0.18	0.14
Alcoholic psychoses	-0.04	-0.51*	0.38	-0.09	0.08	0.06

Table 1: Relationship between the structure of alcohol consumption and the level of alcohol problems in Russia. Results of Spearman correlation analysis and correlation analysis of time series (lag 0).

Discussion

First of all, we should discuss the reasons for changes in the structure of alcohol consumption during the period under review. The increase in the share of strong alcohol in the second half of the 1980s was associated with an increase in the level of consumption of vodka and unregistered alcohol, as well as a decrease in the consumption of

wine and beer [9]. The main factors of the sharp increase in the share of strong alcohol in the first half of the 1990s were: increased physical and economic availability of licensed vodka, as well as increased consumption of unregistered alcohol (vodka and moonshine) due to the abolition of the state alcohol monopoly in 1992 [9]. Empirical data suggest that the sharp increase in alcohol-related problems in the first half of the 1990s was to some extent mediated by an increase in the share of strong alcohol in the consumption structure.

A significant increase in the share of beer in the structure of alcohol consumption, which was observed during the last decade of the period under review, is most likely due to an increase in the economic availability of beer [15]. In addition the increase in the specific weight of beer may be a reflection of the European trend of recent decades - the homogenization of alcohol consumption styles with the displacement of strong alcohol from the structure of consumption [7].

The analysis of time series revealed the existence of a statistically significant relationship between the specific weight of strong alcohol in the structure of consumption and mortality from acute alcohol poisoning. The data obtained are consistent with the results of previous studies which showed that fatal alcohol poisoning is more associated with the level of vodka sales than with the overall level of alcohol sales [11]. Together these data provide additional evidence that the main reason for the high death rate from acute alcohol poisoning in Russia is the “Northern” style of consumption of strong alcohol.

The existence of a negative correlation between the specific weight of beer in the structure of alcohol consumption and fatal alcohol poisoning fits well with the idea that the use of “low-alcohol” beverages is associated with a lower risk of acute alcohol poisoning than the use of strong alcoholic beverages. However it should be borne in mind that the style of drinking beer as well as the style of drinking vodka is characterized by explosiveness [15].

In conclusion, we should note the limitations of this study which may have had an impact on its results. First of all it should be noted that the level of alcohol mortality is influenced by various factors not considered in this study. Unrecorded risk factors for mortality from acute alcohol poisoning include the consumption of alcohol surrogates, organization of emergency medical care and so on [8]. The sharp increase in the death rate from cirrhosis of the liver which was observed at the end of the last and beginning of this century was largely due to the increase in the incidence of viral hepatitis [16]. The peak of mortality from liver cirrhosis in 2006 is associated with the epidemic of toxic hepatitis after the introduction of new denaturing additives this year [17]. The existence of unaccounted variables makes it much more difficult to assess the relationship between alcohol consumption patterns and alcohol problems. Another limitation of this study is the lack of reliability in assessing the overall level of alcohol consumption [9].

Thus the results of this study partially confirmed the working hypothesis about the influence of alcohol consumption patterns on the level of alcohol-related problems. In particular it was found that the death rate from acute alcohol poisoning is mediated by the specific weight of strong alcohol and beer in the structure of alcohol consumption. The data obtained can serve as an argument in support of alcohol policy aimed at changing the structure of alcohol consumption in favor of low-alcohol beverages. At the same time, it should be borne in mind that the strategic goal of alcohol policy is to reduce the overall level of alcohol consumption.

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