

## **Alcohol Abuse and Toxicity of Alcoholic Beverages in Russia: Recent history**

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**ABSTRACT:** *The purpose of this mini-review is discussion of health-related aspects of alcohol consumption in Russia: toxicity of some legally sold alcoholic beverages, use of the anti-alcohol theme to distract public attention from drawbacks of the public health, property-related and other offences against alcohol-dependent people. Some governmental campaigns indirectly contributed to heavier intoxications and consumption of surrogates. The anti-alcohol campaign (1985-1988), and the predictable increase in the alcohol consumption thereafter, destabilized the society thus facilitating the economical reforms of the 1990s. The alcohol-related mortality temporarily decreased during the campaign; but the incidence of poisonings by surrogates was growing. After the end of the campaign, alcoholic beverages have become easily available and relatively cheap, while their quality worsened. The state alcohol monopoly was revoked in 1992. After that, technical alcohol, synthetic or cellulosic, gained access to the beverage market: mixed with water, it was sold as vodka, added to beer, wine and other drinks. The incidence of poisonings by legally sold beverages increased during the early 1990s, while the mortality increase outstripped the alcohol consumption. The large-scale outbreak of poisonings in 2006 was caused by disinfectant sold in vodka bottles. Some cases were probably caused by organochlorides. However, the conclusion is optimistic: the decrease in mortality in Russia since 2006 may be related to improvements in the healthcare, better quality of alcoholic beverages, and decline in the heavy binge drinking of vodka, partly replaced by the moderate consumption of beer. Better supervision of sold alcoholic products by authorities is necessary.*

**Keywords:** *Alcohol consumption; alcohol toxicity; alcoholic beverages; alcoholism; public health; Russia.*

### **Abbreviations**

AAC - Anti-Alcohol Campaign

LTP - Labor-and-Treatment Prophylactorium

PHMG - Polyhexamethylene Guanidine

PHMB - Polyhexamethylene Biguanide

LD50 - Lethal Dose 50%

GC-FID - Gas Chromatography with Flame Ionization Detection

GC-MS - Gas Chromatography - Mass Spectrometry

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### **1. INTRODUCTION**

The purpose of this review is the accentuation of health-related aspects of alcohol consumption in Russia: toxicity of some legally sold alcoholic beverages, use of the anti-alcohol rhetoric to distract public attention from drawbacks of the healthcare, property-related crime against alcohol-dependent people aimed among others at appropriation of their residences. During the Soviet time, drunkenness at workplaces was tolerated at many factories and institutions. In some places, these traditions persisted also after the economic reforms. Ringleaders could be observed in students, workers and intelligentsia teams, who manipulated others to consume large amounts of alcohol. Non-drinkers were sometimes stigmatized. It is known that the state, at various times, encouraged alcohol sales in Russia [1], while some results of anti-alcohol campaigns (AAC) have been different from proclaimed goals.

### **2. TREATMENT OF ALCOHOLISM IN RUSSIA**

The treatment of the alcohol dependence was generally of low efficiency. Aversive therapy using emetics and disulfiram was applied along with verbal persuasion named rational psychotherapy [2-4]. The "labor-and-treatment prophylactoriums" (abbreviated LTP also in Russian) were a form of

detainment for chronic alcohol abusers violating public order and work discipline. However, patients in LTPs were not devoid of the access to alcohol: trips to the bottle store through loopholes “unnoticed” by the administration could be regularly observed. Implantation of disulfiram preparations has been performed. After the implantations, the disulfiram-alcohol reactions were reportedly observed in some cases, but were usually absent [4], which agrees with the concept that this therapy is in fact placebo [5,6]. Many patients started drinking shortly after the implantation. During the 1990s, the business with the treatment of alcoholism had become widespread, including physicians not specializing in addictions as well as charlatans [7].

The ultra-rapid (single procedure) psychotherapy of alcohol dependence, known as “coding” [8,9], should be commented upon. The method was started during the AAC; it has been criticized for being incompatible with medical ethics because of verbal intimidation, unpleasant manipulations such as spraying the throat by chloroethane, “intense thumb pressure” on the trigeminal nerve branches, and forceful backwards movements of the patient’s head by the hands of the therapist [10]. The latter procedure is precarious in patients with vertebral anomalies. The popularity of the ultra-rapid psychotherapy was explained by economical motives: minimum effort and maximum profit [11].

Another treatment not compatible with international practice has been the use of antipsychotic drugs (e.g., phenothiazines or haloperidol) for the alcohol dependence [3,4,12]. Among contraindications, the potential synergism between some antipsychotics and alcohol [13], aggravating the liver injury, should have been taken into account. Intravenous infusions (sodium chloride, glucose solutions, dextran) were broadly applied and recommended for detoxification and rehydration also for the “moderately severe withdrawal syndrome” [4]. Indications for the prolonged intravenous infusions have been sometimes questionable: alcohol and its derivatives are discharged spontaneously; the rehydration can be achieved by an oral intake of liquids. In conditions of suboptimal procedural quality assurance, the prolonged infusions could have resulted in thrombotic complications and the spread of viral hepatitis. It is known that the combined alcoholic and viral liver injury is associated with unfavorable prognosis. Apparently, the idea of punishment and irresponsibility has played a role in the approaches used by some medical personnel and functionaries [14]. The principle of informed consent has been insufficiently known and observed; authoritative or paternalistic attitude to patients often prevailed [15].

Modern treatments of alcohol dependence (naltrexone, nalmefene, acamprosate, baclofen, ondansetron, topiramate as well as psychotherapy) are increasingly available today [4,16], admittedly, requiring payment. However, according to an estimate, no more than 5-8 % of alcohol abusers have been treated for an alcohol or drug use disorder [16]. Economical sanctions against Russia have interfered with the availability of imported drugs since 2014. The procedure of registration of foreign drugs and medical equipment is complicated and lengthy [17]. New domestic research was aimed, in particular, to the anticonvulsants as anti-craving medications [4,18-20]. Free treatment of alcohol dependence is available at the narcological dispensaries (governmental substance abuse prevention and treatment centers). Some patients face the alternative: anonymous treatment against payment or free therapy after a registration with a dispensary. The registration is a stigma; many employers ask for a certificate from the dispensary, therefore alcoholics tend to avoid the registration. The certificate is required also for other occasions, notably, for the driving license. The procedure of acquisition of the certificate, although often being a formality aimed at gathering of money, includes an examination by a medical specialist for addictions (named narcologist in Russia) and can be regarded as a screening method for alcohol and other addictions covering a large part of the adult population.

### **3. THE ANTI-ALCOHOL CAMPAIGN 1985-1988 AND ITS CONSEQUENCES**

The AAC (1985-1988), and the increase in the alcohol consumption thereafter, destabilized the society thus facilitating the economical reforms of the 1990s. Workers and employees did not oppose privatizations of state-owned enterprises by the management and party activists because of the widespread alcohol abuse, workplace theft, use of the factories’ equipment for private purposes etc., which was knowingly tolerated by authorities at that and earlier time [21]. Alcoholics are prone to the emotions of guilt and shame, tend to have a low self-esteem [22], thus being easier to manipulate. The alcohol-related mortality decreased temporarily during the AAC; but the incidence of poisonings by surrogates was growing. The home-made alcohol (moonshine) production increased considerably during the AAC. Cheap lotions, window cleaner etc. were massively sold and consumed, which was tolerated by the authorities.

#### **4. QUALITY OF ALCOHOLIC BEVERAGES**

After the end of the AAC in 1989, alcoholic beverages have become easily available; queues have disappeared. The state alcohol monopoly was revoked in 1992. After that, synthetic and cellulosic alcohol gained access to the beverage market: mixed with water, it was sold as vodka, added to beer, wine and other drinks [7,23-25]. Synthetic alcohol was imported to Russia from neighboring countries: queues of tankers with ethanol were observed at border crossings. Whether and how these tankers were cleaned inside, and what kind of liquids they had transported before, is unknown. The alcohol was diluted and poured out into vodka bottles. It can be reasonably assumed that for small manufacturers it would be uneconomic to properly wash the bottles and to purchase the necessary equipment. Cases of e.g. organochloride poisoning from the contents of vodka bottles are known. The incidence of lethal poisonings by legally sold beverages increased considerably during the early 1990s [23]. Sales of beverages containing technical alcohol and other surrogates through legally operating shops and kiosks occurred generally with the knowledge of authorities.

#### **5. ALCOHOL CONSUMPTION AND SOME ASPECTS OF PUBLIC HEALTH**

After the AAC, the average life expectancy at birth in Russia has decreased. For the period 1993-2001, the life expectancy in men was estimated to be 58-59 years [7,26,27]. Causes of the increased mortality included the limited availability of the up-to-date healthcare, chronic diseases often left untreated, relatively late diagnostics of malignancies [28], toxicity of some legally sold alcoholic beverages, property-related crime against alcohol-dependent people resulting in homelessness. As discussed above, one of the causes of enhanced mortality after the AAC was the abundance of falsified alcoholic beverages, produced from technical alcohol and other surrogates, sold through legally operating shops and kiosks. Numerous fatal intoxications after a consumption of moderate amounts were reported, with a relatively low level of alcohol in blood [7,23-26]. After 1991, the increase in mortality outstripped the alcohol consumption; the latter increased from 1987 to 1992 by 25-27 %; while the mortality from alcohol-related causes during the same period increased 2.5-fold [24]. For the whole Russian Federation, the mortality rate from alcoholic poisonings increased from 1998 to 2004 by 58 % and continued growing [26]. Besides, the low quality of alcoholic beverages probably contributed to the incidence increase of acute pancreatitis [29]. In Russia, the rate of pancreatitis mortality has been among the highest worldwide. After the AAC, the pancreatitis mortality increased in the years 1992-1994 by 72.3% and 29.6% in men and women respectively. After a slight decrease in 1995-1998, the pancreatitis mortality rose again in 1998-2005 by 84.3% and 46.4% in men and women respectively, outrunning the increase in alcohol consumption for the corresponding periods [30,31]. Epidemiologic data indicate a higher frequency of alcohol-induced acute pancreatitis in the areas where surrogates and moonshine are available [32]. For example, methyl alcohol can induce pancreatic injury [33]. Non-purified alcohol and self-made beverages may contain more methanol than standard beverages [24].

Poisonings by legally sold alcoholic beverages occurred repeatedly [24]. The large outbreak of toxic liver injury in 2006 was reportedly caused by the disinfectant “Extrasept-1” sold in vodka bottles in different regions of the country. Apart from ethanol, this disinfectant contained 0.08-0.15% of diethyl phthalate and 0.1-0.14% of polyhexamethylene guanidine hydrochloride (PHMG). The number of poisonings with pronounced jaundice during the period August-November 2006 was reported to be 12,611 including 1189 lethal cases [34,35]. Microscopically, “cholestatic hepatitis with a severe inflammatory component” was described [35]. However, toxicological assessment of PHMG and of the related compound - polyhexamethylene biguanide (PHMB) has found no pronounced hepatotoxicity, while PHMG had broader margins of safety than PHMB. Both substances are used worldwide for disinfection of swimming pools. The LD50 in rats for PHMG is 600 mg/kg, while the rats died from the damage to the central nervous system and not from hepatotoxicity [36]. As for diethyl phthalate, its acute toxicity to mammals is low [37,38]. Some phthalates can induce liver injury but it has not been confirmed when tested in primates and humans [39]. There is a suspicion that some intoxications were caused by hepatotoxic substances, e.g. organochlorides. In particular, carbon tetrachloride, used in the dry cleaning of clothes, is known to be hepatotoxic [40]. The “chloride compounds” (organochlorides) were mentioned as the proposed cause of the liver injury in 2006 in [41]. The toxic liquids were sold through legally operating shops and kiosks in vodka bottles [34], which has apparently been obfuscated in some papers stating that poisonings with hepatotoxicity were caused by denaturing additives [42] or creating an impression that consumers deliberately

purchased the disinfectant for drinking: “According to the media and personal communications by narcology experts, this outbreak was caused by the consumption of antiseptics with chloride compounds due to the deficit of other non-beverage alcohol” [41]. It should be stressed that there was no “deficit of other non-beverage alcohol” [41] but a temporary deficit of legal alcohol caused by an elevation of excise duties in 2006 [4]. The deficit was compensated by surrogates sold in vodka bottles [35].

The only major exception are cheap alcohol-containing liquids from the pharmacy. Similarly to vodka, such liquids are not supposed to contain toxic admixtures. Recently it was reported on over 60 dead from poisoning with a *Crataegus* (hawthorn) liquid in Irkutsk. The cause of the poisoning was supposedly methanol, although on the label it was written “ethanol” (INTERFAX 21 December 2016 <http://www.interfax.ru/russia/542394>).

Furthermore, the well-known association between alcoholism and the suicide was confirmed by correlations between the rates of suicides with a measurable blood alcohol concentration (BAC) and the incidence of alcohol psychoses. Both the BAC-positive suicides and the alcohol psychosis rate dropped sharply during the AAC, started to increase in 1988, and “dramatically jumped” from 1991 to 1998 [43]. In 1999 there was a slight decrease in both rates, and from 2000 they started to rise again until 2004, having decreased thereafter [43]. Both curves (alcohol psychosis and BAC-positive suicide rates) closely follow each other as curves usually do in reports by Razvodovsky [30,43-45]. It is known that correlations are not necessarily causative. Psychosis-like conditions may be caused not only by ethanol but also by admixtures in poor-quality alcoholic beverages and surrogates. Misdiagnosis of neurological symptoms after the ingestion of toxic alcohol-containing fluids as psychosis cannot be excluded; drinking of denatured alcohol is associated with the increase in toxicity to the central nervous system [46]. Over diagnosis of psychosis was generally known to occur [47]. It was reported that e.g. methanol and carbon tetrachloride produced hallucinations or other symptoms of psychosis [48-50]. We observed marked disorientation, unusual for ethanol intoxication, after a consumption of poor quality fortified wine. The alcohol psychosis rate might be “a proxy for alcohol consumption” [43] in countries with a stable quality of consumed alcohol but not for Russia, where the quality fluctuated considerably. Other potentially confounding variables changing with time such as malnutrition of marginalized people should be taken into account.

The rate of BAC-negative suicides slightly increased after the start of the AAC (1985 – 6.25; 1988 – approximately 6.6 per 100.000 of residents), then decreased to 6.1 after the AAC failure, which coincided with the peak of optimism at the beginning of the economical reforms around 1991. Thereafter, both the BAC-positive and BAC-negative suicide rates increased steadily, the latter - up to approximately 10.4 in 2003 [43]. These data indicate that dynamics of suicides depend not only on the amounts of consumed alcohol, but also on social factors. It can be reasonably assumed that the increase in the suicide rate after 1991 has been partly caused by deterioration of the social assistance, when many people, unemployed and homeless, were abandoned in a desperate condition [51]. This latter notion is more constructive than discourses about “psychosocial distress” [43] as the welfare in Russia is underdeveloped, unemployment benefits being low and difficult to obtain on the long run. Hopefully, there is an improvement tendency today. The main conclusion by Razvodovsky that “a restrictive alcohol policy can be considered as an effective measure of suicide prevention” [43] may distract attention from solvable social problems.

However, there are some indicators of improvement. The quality of sold alcoholic beverages seems to be better today than 10 years ago, although beer and wine sometimes smell technical alcohol. There have been no mass poisonings, known to us, by legally sold alcoholic beverages since 2006. Several vodka specimens bought in Komi-Permyak Okrug - the region with one of the lowest life expectancy levels in the Russian Federation [52] – were assessed by Prof. D.A. Ford and Prof. R.J. Korthuis [53,54]: no unusual toxic admixtures were found by means of the gas chromatography with flame ionization detection (GC-FID) and gas chromatography- mass spectrometry (GC-MS). The chromatographic methods are in use for the quality control of alcoholic beverages also in Russia [55]; however, the extent of the control measures applied to the sold products is unknown. The decrease in mortality in Russia since 2006 [56] may be related to improvements in the healthcare, better quality of alcoholic beverages, decline of the heavy binge drinking of vodka [57], partly replaced by a moderate consumption of beer [31,58,59] (Table 1).

**Table 1.** Sales of alcoholic beverages to the population of Russia (million decaliters) [59].

Years	2005	2009	2010	2011	2012	2013	2014
Vodka and liqueurs	203.5	166.1	157.8	156.4	153.0	133.6	124.7
Wines (without sparkling wines)	84.9	102.5	103.4	97.1	93.6	83.6	83.3
Sparkling wines and “Champagne”	19.4	25.5	27.3	28.5	28.3	27.7	28.6
Beer	892	1025	1004	1012	1018	984	1001
Total (converted to absolute alcohol)	133.2	129.6	127.6	126.8	131.1	122.1	119.3
Liters per capita (converted to absolute alcohol)	9.3	9.1	8.9	8.9	9.2	8.5	8.3

**6. RECENT ANTI-ALCOHOL POLICIES**

The “effects of specific alcohol control policy measures on alcohol-related mortality” are sometimes discussed as if alcohol were a single factor determining mortality changes [60]. Other factors are rarely mentioned: availability and adequacy of the healthcare, toxicity of some legally sold alcoholic beverages (discussed above), decline of the heavy binge drinking [57], reliability of statistics [28], unemployment, housing and living conditions. Apparently, the efficiency of governmental policies is exaggerated in [60,61]. At the same time, there is a vacuum in advocacy for the public interest. The following citations are illustrative: “The effect of alcohol taxation measures is likely to be significant and moderately positive. However, its significance was outperformed with much stronger effects of the measures to reduce availability of ethyl alcohol and non-beverage alcohol with very high alcohol content” and “All these measures greatly reduced the amount of ethyl alcohol available...” [60]. In fact, after the end of the AAC in 1989, vodka and strong beer have become easily available (no queues as during the Soviet time, more shops), while the salary / vodka price ratio has remained many times higher than that prior to the campaign [62]. Khaltourina and Korotayev discussed the role of the “crisis of medicine” in their Russian-language book [63], arguing against the significant role of this factor in the mortality increase. However, validity of arguments is questionable e.g. the unchanged since the Soviet time mortality rate among stroke patients while the stroke incidence has increased. Probable over diagnosis of stroke and cardiovascular diseases i.e. unreliability of statistics has been discussed previously [28]. Decreasing since 1999 infant and maternal mortality, discussed in [63] as a proof for health care improvement, may reflect priorities in the healthcare but is unrelated to the mortality increase predominantly in men [64]. Regular medical checkups, maintained in many factories and institutions during the Soviet time, have been discontinued. All medications for the outpatient treatment, some diagnostic and therapeutic procedures are not covered by medical insurance. For these and other reasons, many people stay at home even if they have symptoms, receiving no adequate treatment for chronic diseases.

According to our observations, consumption of technical and household (e.g. window cleaner) liquids and lotions has decreased abruptly after the AAC, so that the “non-beverage alcohol with very high alcohol content” [60] has hardly played any significant role ever since, apart from pure medicinal or technical ethanol purloined at some workplaces. Apparently, there is a tendency to exaggerate the consumption of non-beverage alcohol allegedly bought by consumers from “illegal market” [42,61]; more details are in Jargin [65]. Note that apart from the limited sales of homemade alcohol mainly to neighbors in rural areas or reselling at night of beverages legally bought during the daytime, there is no illegal alcohol retail market in Russia. All vodka and other alcoholic beverages, including imitations of foreign products [66], those concealed from excise duties, or made “in garages” [67], have been sold through legally operating shops, supermarkets, eateries, and previously also kiosks.

The “specific alcohol control policy measures” introduced in 2006 and later [60] have been, in the author’s opinion, rather superficial. These measures may reflect interactions between some groups involved in the alcohol production and trade; but they resulted only in moderate oscillations of real vodka price considering inflation and no significant decrease in physical availability of alcohol. Some governmental measures may even have contributed to consumption of higher doses, e.g. disappearance of small (0.33l) beer cans. Another recent measure – the prohibition from 1 January 2013 of beer sales between 23 p.m. and 8 a.m. (in places stricter) – results in purchasing by some people of larger amounts in advance with subsequent consumption. Physical restrictions of alcohol

availability may lead to a decrease in the total alcohol consumption [68] but may contribute to heavier occasional intoxications i.e. binge drinking. In this way acted queues during the Soviet time: after queuing, larger amounts of alcohol were purchased and consumed. Analogously, having waited in a queue at the entrance to a beerhouse (pivnoi bar), visitors stayed there for hours. Summarizing the above, the conclusion of the article [56] should be agreed with: “We believe that the continuous reduction in adult mortality which has been observed in Belarus and Russia over the past decade cannot be explained by the anti-alcohol policies implemented in these countries” [56].

## 7. CONCLUSION

All said, the conclusion is cautiously optimistic: Russia has made a step from her alcoholic past. However, alcohol consumption still remains a part of our life; and it can be eliminated only together with life. The last AAC and its consequences have demonstrated it. The concept of absolute sobriety as a goal of alcohol policies and alcoholism treatment, propagated e.g. by the prominent surgeon Fedor Uglov, seems to be unrealistic. Figuratively speaking, the AAC was a surgery performed without sufficient indications. The AAC and its predictable failure have been used to facilitate the economic reforms of the early 1990s including the privatization of factories and other state property. A reasonable alternative would be the harm reduction policies, used in some countries, seeking to reduce the negative impact of the consumption of alcohol, legal and illegal drugs on the individual and public health. Such policies look to mitigate the harm and promotes initiatives that respect and protect the human rights of substance abusers. The harm reduction is consistent with traditions of medicine and public health; it can be seen as a reasonable compromise between the public health and human rights [69,70].

The labor productivity is growing; but unemployment is persisting, and there are not enough prestigious jobs for everybody. Under these circumstances, alcoholics especially of older age can be regarded as voluntary outsiders, leaving their places to more energetic people. Following the example of more developed countries, aged alcohol-dependent people should have a possibility to spend time in public houses and then go home, under the condition of maintenance of public order. Moderate alcohol consumption may be permitted in homes for the aged. However, it must be taken into account that alcohol is contraindicated in certain diseases, and incompatible with some drugs, which requires competent advice. It should be mentioned that conditions in Russian homes for the aged and psychiatric hospitals are suboptimal [47,71]. Experience of foreign countries should be studied in this field. Improvement of professional skills and remuneration of personnel in Russian homes for the aged and psychiatric hospitals is necessary, whereas the question of patients' rights in such facilities should not be forgotten [47,71]. The society must care of its unprotected members, including those suffering of alcoholism and alcohol-related dementia.

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