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ALCOHOL CONSUMPTION AMONG PREGNANT AND NON-PREGNANT WOMEN IN RUSSIA: EVIDENCE FOR PREVENTION

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Background. Russia has one of the highest levels of alcohol consumption in the world and increasingly hazardous drinking in young women. Prenatal alcohol exposure is associated with adverse pregnancy outcomes and Fetal Alcohol Spectrum Disorders (FASD) in children. Data on women's alcohol consumption and risk for alcohol-exposed pregnancies necessary for developing prevention of FASD in Russia are limited.
Aims: to estimate the prevalence of alcohol use and hazardous drinking and risk for alcohol-exposed pregnancies in women of childbearing age.
Materials and methods. Women were recruited at public women's clinics in two regions in Russia. Women of childbearing age (n = 648) completed a face-to-face structured interview which assessed alcohol consumption and contraception use.
Results. Among non-pregnant women, 89 % reported consuming alcohol and 65 % reported binge drinking in the last three months; 70 % of women in Nizhny Novgorod Region and 44 % in Saint-Petersburg may become pregnant, including 12 % in Nizhny Novgorod Region and 9 % in Saint-Petersburg who were trying to conceive. These women consumed alcohol at similar rates and amounts as women who were not at-risk for pregnancy. Among currently non-pregnant women, 32 % in Saint-Petersburg and 54 % in Nizhny Novgorod Region reported not using contraception consistently and at-risk drinking; therefore, they were at risk for alcohol-exposed pregnancy. After pregnancy identification: 20 % reported continued drinking. Significant differences in drinking and risk for alcohol-exposed pregnancy between women in Saint-Petersburg and Nizhny Novgorod Region were identified.
Conclusions. Although the majority of Russian women decrease alcohol consumption after pregnancy identification, high levels of drinking were reported around conceptions and prior to pregnancy identification.

Key words: *fetal alcohol spectrum disorders, women, alcohol drinking, pregnancy, reproductive health, preventive medicine*

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ИЗУЧЕНИЕ УПОТРЕБЛЕНИЯ АЛКОГОЛЯ БЕРЕМЕННЫМИ И НЕБЕРЕМЕННЫМИ ЖЕНЩИНАМИ В РОССИИ

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Россия имеет один из самых высоких уровней употребления алкоголя в мире и всё более опасный уровень употребления алкоголя молодыми женщинами. Внутриутробное воздействие алкоголя связано с неблагоприятными исходами беременности и фетальным алкогольным спектром нарушений у детей.
Цель исследования: оценка распространённости употребления алкоголя, а также риска влияния алкоголя на беременность у женщин репродуктивного возраста.
Материалы и методы. Исследование проводилось на базе женских консультаций двух регионов России: Нижегородская область и Санкт-Петербург. С помощью скрининга в исследование было отобрано 648 женщин детородного возраста. Все участницы исследования прошли очное структурированное интервью, в ходе которого оценивался уровень потребления алкоголя и использование противозачаточных средств.
Результаты. Среди небеременных женщин 89 % сообщили об употреблении алкоголя и 65 % сообщили о массивном употреблении алкоголя в течение последних трёх месяцев; 70 % женщин в Нижегородской области и 44 % в Санкт-Петербурге могли забеременеть, в том числе 12 % в Нижегородской области и 9 % в Санкт-

Петербурге, целенаправленно планировали беременность. Данные женщины употребляли алкоголь в таких же количествах, как и женщины, с низкой вероятностью наступления беременности. В настоящее время среди небеременных женщин 32 % в Санкт-Петербурге и 54 % в Нижегородской области сообщили, что не используют контрацепцию регулярно и употребляют алкоголь в рискованных количествах. После выявления беременности 20 % женщин сообщили о продолжении употребления алкоголя. Выявлены существенные различия в употреблении алкоголя у женщин в Санкт-Петербурге и Нижегородской области.
Исследование, представленное в данной публикации, было поддержано грантами R01AA016234 (Балашова), R21TW006745 (Боннер) Национальным институтом здоровья (NIH), Национальным институтом злоупотребления алкоголем и алкоголизма (NIAAA) и Международным центром Фогарти (FIC).

Ключевые слова: *фетальный алкогольный синдром плода, женщины, употребление алкоголя, беременность, репродуктивное здоровье, профилактическая медицина*

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BACKGROUND

The use of alcohol during pregnancy is one of the leading preventable causes of birth defects, mental retardation and developmental disabilities. Fetal Alcohol Syndrome (FAS) is the best known and most debilitating outcome of an alcohol-exposed pregnancy (AEP), associated with heavy maternal drinking. There is growing evidence that prenatal alcohol consumption at lower levels can result in a wide range of less profound effects called Fetal Alcohol Spectrum Disorders (FASD) [8]. Animal and human studies indicate that alcohol has long-term adverse effects on the fetus throughout pregnancy and the severity and character of disturbances are related to the amount of maternal alcohol consumption, timing of exposure, and other factors [8]. Consumption of large quantities of alcohol in a short time period (i.e., binge drinking) is believed to be particularly harmful for fetal development [12]. Recent studies identified growth deficits, behavior problems, and other adverse child outcomes associated with low to moderate alcohol consumption during pregnancy.

Although the extent of individual impairment may be slight at the lower end of FASD severity, the public health significance can be magnified by the prevalence of FASD in the population. Recent studies indicate that the worldwide prevalence of FAS and FASDs may be higher than it has been thought. A study among first-graders in four communities in the United States report FASD prevalence of 1.1 % to 5.0 % [13]. Although data on FASD prevalence among Russian children do not exist, a recent review indicated that the highest known prevalence of Fetal Alcohol Syndrome was among children residing in an orphanage for children with special needs in Russia [11].

Children and adolescents affected by prenatal alcohol exposure may have low height and weight, typical for prenatal alcohol exposure facial dysmorphology, and functional or/and structural neurobehavioral impairments that may result in life-long disabilities. The brain damage could manifest in functional impairments of neurocognition, self-regulation, adaptive, and executive functioning. Special clinical guidelines have been published recently for pediatric primary care clinicians urging to identify, diagnose, and refer children with FASDs to medical, social, and other services.

Although there is no known cure for FASD, the disorders are completely preventable by avoiding alcohol use during pregnancy, including in the interim between conception and pregnancy identification. An estimation of women's alcohol consumption and identification of the risk for AEP in a specific population are important steps in developing FASD prevention.

The rate of alcohol consumption in Russia is known to be among the highest in the world. There is a strong tradition of holiday drinking in Russia for both men and women that has deep historical roots. In a stratified convenience sample of women interviewed in groups at workplaces, schools, and OB/GYN clinics in St. Petersburg, a high percentage (95.9 %) reported consuming alcohol in the last 12 months, 7.6 % reported drinking heavily, and 18.4 % reported binge drinking [5, 10]. Nearly all of the pregnant Russian women surveyed reported drinking in the year before becoming pregnant, 60 % drank to some extent after they knew they were pregnant, 34.9 % drank during the past 30 days, and 7.4 % reported binge drinking during pregnancy. In a longitudinal pregnancy outcome study in Moscow, 85 % of pregnant women reported alcohol consumption in the month around the time of conception or in the most recent month of pregnancy, 20.2 % reporting at least one episode of five or more drinks around the time of conception, and binge drinking (five or more drinks in last month) was reported by 4.8 % of pregnant women [5, 10]. This showed higher proportions of pregnant women who continue to consume alcohol during pregnancy in Russia than it was reported in some other countries. The extent to which Russian women change their drinking behavior when they are attempting to become pregnant, or when they do become pregnant, remained unknown.

AIM OF THE STUDY

The study was aimed to estimate the prevalence of alcohol use and hazardous drinking among women of childbearing age in Russia, including a) if they might become pregnant, b) when they are actively attempting to become pregnant, and c) when they identify that they are pregnant. Based on the initial finding that women have limited knowledge about AEP and FAS/FASD, it was hypothesized that women do not cease drinking in periods when they may become pregnant.

METHODS

Study Design: This was an observational study that utilized a cross-sectional survey design.

Sample. Participants were women aged 18-44 (i.e., of childbearing age) recruited at seven public women's clinics in 2004-2005. Four clinics were in St. Petersburg (SPB) and three clinics in the Nizhniy Novgorod Region (NNR), including one clinic in Nizhny Novgorod city and

two clinics in rural districts. The two study locations, SPB and NNR, represent a diverse sample of women residing in an inner city and more rural areas [3].

Recruitment of women was stratified across four groups of participants, including pregnant and non-pregnant women in SPB and NNR. Prospective participants were approached in clinic waiting rooms by research assistants who were female psychology graduate students from St. Petersburg State University (SPSU) and Nizhniy Novgorod State Pedagogical University (NNSPU). The assistants were trained and supervised by the study's principal investigators and local PhD level psychologists. The study was reviewed and approved by IRBs at St. Petersburg State University (SPSU) and the University of Oklahoma Health Sciences Center (OUHSC) and was conducted with approvals from the participating clinics. There was a high level of willingness to participate by the women; for example, 89 % of women approached about the study in NNR agreed to participate.

There were 657 women enrolled in the study. Data from nine women were not included in the analysis; seven women were younger than 18 years and two did not have time to complete all measures. The final sample included 648 eligible women: 342 women from SPB (146 pregnant, 196 non-pregnant) and 306 women from the NNR (155 pregnant, 151 non-pregnant).

The main outcomes of the study were women's alcohol consumption and the risk for alcohol-exposed pregnancies. Several measures were utilized to assess the outcomes.

Measures: Data were collected using a structured 40-50 minute interview. Items were drawn from US and international measures that were reviewed for cultural appropriateness by bilingual project investigators and then underwent standard forward and backward translation procedures and feasibility piloting before implementation.

Alcohol consumption measures: Several measures were used to detect at-risk drinking, i.e., consuming alcohol above established cut-off limits. The definition of risky drinking for women has changed over time and is defined differently depending on pregnancy status. Pregnancy risk drinking (i.e., drinking during pregnancy at levels considered risky to the fetus) was defined previously as consuming one ounce or more of absolute alcohol per day (i.e., two or more drinks). More recent findings show that even low levels of alcohol consumption can lead to negative child outcomes and there is no safe level of alcohol consumption during pregnancy, therefore any alcohol use in pregnant women was considered risky. Risky drinking for non-pregnant women is consumption that constitutes a risk for health consequences and is defined currently as consuming eight or more drinks in a week or more than three drinks in a day; consuming for or more drinks on one occasion constitutes binge drinking for a woman. The study used self-reports to assess alcohol consumption. Despite some concerns about the use of self-reports, the reliance on self-report measures of alcohol consumption in research has been supported by a number of studies [9].

Instruments: *Tolerance, Annoyed, Cut down, Eye-opener (T-ACE)* is a four-item screening instrument developed and validated for detection of risk-drinking (defined as alcohol consumption of one ounce or more per day) in obstetric populations. Studies indicate that the level of pre-pregnancy alcohol consumption is a predictor of pregnancy drinking and T-ACE is a valuable tool for identifying alcohol consumption during pregnancy [17]. The instrument includes a question about tolerance (the number of drinks until one feels high), questions about annoying people because of one's drinking, feeling the need to cut-down, and having an eye-opener drink in the morning. T-ACE scores range from 0 to 5 and a score of 2 or more indicates risk for pregnancy drinking.

Tolerance, Worried, Eye-opener, Amnesia, Cut down (TWEAK). This five-item instrument was developed to screen for risk-drinking during pregnancy using preconceptional drinking as a standard [16]. Two tolerance questions are used in the TWEAK: one asks how much a woman can hold before feeling sick, passing out, or falling asleep (TWEAK-Hold version), and another asks how many drinks until an effect is perceived (TWEAK-High version). Scores on the instrument range from 0 to 7 and a total score of 2 or more points indicates an at-risk drinker. Embedded versions of TWEAK and T-ACE in interviews are both highly sensitive and specific to preconceptional risk drinking and used as indicators of risk for alcohol consumption during pregnancy.

Quantity/Frequency measure. Each woman was asked if she drinks alcoholic beverages occasionally and women who reported any drinking were asked to describe their weekly drinking patterns [3]. Both a binary indicator (drink/no drink during pregnancy) and a quantity variable were used in the analyses. An item was derived to correspond to the at-risk criterion of more than seven drinks per week. Pregnant participants completed the measure describing their alcohol consumption three months before pregnancy and after they knew they were pregnant.

Binge Drinking. To assess for binge drinking, non-pregnant women were asked how often they consumed four or more drinks on a single occasion during the last three months [14]. Pregnant women were asked to report the frequency of binge drinking three months prior to pregnancy and since they knew they were pregnant. A binary indicator of *binge* drinking (Yes – reported any frequency of binge drinking; No – no binge drinking reported) was used in the analyses. For those who reported any binge drinking, affirmative categories ranging from 'Less than once a month' to 'Daily' were selected and a continuous variable (ranging from 1- Not at All, to 8- Daily) was used.

Preconceptional Period: *"Risk" of becoming pregnant.* To assess the risk of becoming pregnant, participants were asked about sexual intercourse and use of contraception during the six months prior to the interview or, for those currently pregnant, six months prior to pregnancy. For those reporting sexual intercourse without contraception during those intervals (n = 469), a binary indicator of pregnancy risk was created (Yes – *at risk for pregnancy* because reported at least one intercourse without any contraception; No – no intercourse without contraception). For the subset of women (n = 222) who endorsed intentionally *trying to conceive*, a second binary indicator of pregnancy "risk", trying to conceive, was developed.

Risk for alcohol-exposed pregnancy (AEP). Non-pregnant women's risk for AEP was defined as being at-risk

of becoming pregnant and at-risk alcohol consumption (more than three drinks on one occasion or in one day or more than seven drinks per week) in the last three months.

Data Analysis. Generalized estimating equations (GEE) were used to estimate overall-sample and stratum-specific means (or proportions), standard errors for the consumption and demographic variables, and to compare across pregnancy risk groups. The GEE estimation of mean and variance functions was dependent on variable type, using the Normal moment equations for symmetric and continuous demographic variables (e.g., age), Poisson moments and a log link function for frequency outcomes (e.g., number of drinks), binomial moments and a logit link function (i.e., GEE logistic regression) for dichotomous variables (e.g., drink/never drink), and multinomial moments and generalized logit link functions for polytomous, unordered (e.g., marital status) and ordinal variables (e.g., Likert-formatted responses). Following a recommendation of Hardin and Hilbe [7] for GEE used with a small number of clusters (7 clinics in this study), a robust sandwich estimator of standard error (modified for clustering structure) was calculated, assuming the so-called *independence-model* covariance structure within the sampled clusters (i.e., clinics).

For the pregnant subsample, within-subject comparisons were performed using before and after conception consumption. Random effects Poisson and logistic regression models were constructed to assess the significance of these within-subject differences using a sandwich estimator of standard errors and controlling for a grand mean centered city covariate.

Six strata were formed for analysis by crossing the interview location (SPB or NNR), the woman's pregnancy status (pregnant vs. non-pregnant), and concurrent vs. retrospective reports: concurrent reports about current drinking by non-pregnant women in SPB and in NNR, retrospective reports by pregnant women about their drinking three months prior to the pregnancy in SPB and NNR, and concurrent reports about drinking by pregnant women in SPB and NNR.

The present study was a part of a larger study, and more details on the study materials and methods are available elsewhere [2, 3].

RESULTS

Sample Descriptive Information. The average age of non-pregnant women was 28.9 years; the average pregnant participant was 27.5 years old and at 20.6 (SD = 9.0) weeks of gestation. Further demographic information is presented in Table 1.

The majority of participants self-reported Russian ethnicity (96.8 %) with the remaining participants identifying themselves as Ukrainian, Belarussian, Jews,

Table 1

Socio-demographic characteristics

Demographic category	Pregnant		Non-pregnant		Total (n = 648)
	SPB (n = 146)	NNR (n = 155)	SPB (n = 196)	NNR (n = 151)	
Average age (SD)	26.9 (4.8)	28.1 (5.6)	26.5 (6.3)	31.9 (6.5)	28.2 (6.2)
Marital status					
Married	98 (67.1 %)	124 (80.0 %)	65(33.2 %)	63 (41.7 %)	350 (54.0 %)
Cohabitating	34 (23.3 %)	16 (10.3 %)	34 (17.3 %)	32 (21.2 %)	116 (17.9 %)
Single / divorced / separated / widowed	14 (9.6 %)	15 (9.7 %)	96 (49.0 %)	56 (37.1 %)	181 (27.9 %)
Living environment					
Urban inner city	141 (96.6 %)	84 (54.2 %)	190 (96.9 %)	95 (62.9 %)	510 (78.7 %)
Small city	0 (0.0 %)	47 (30.3 %)	0 (0.0 %)	47 (31.1 %)	94 (14.5 %)
Rural	0 (0.0 %)	21 (13.5 %)	0 (0.0 %)	8 (5.3 %)	29 (4.5 %)
Suburban	5 (3.4 %)	3 (1.9 %)	5 (2.6 %)	1 (0.7 %)	14 (2.2 %)
Education					
No school diploma	0 (0.0 %)	4 (2.6 %)	2 (1.0 %)	3 (1.2 %)	9 (1.4 %)
School diploma	17 (11.6 %)	91 (58.7 %)	34 (17.3 %)	93 (61.6 %)	235 (36.3 %)
Tech college	36 (24.7 %)	3 (2.0 %)	26 (13.3 %)	0 (0.0 %)	65 (10.0 %)
Higher ed. not completed	25 (17.1 %)	2 (1.3 %)	46 (23.5 %)	1 (0.7 %)	74 (11.4 %)
Higher ed. diploma	67 (45.9 %)	55 (35.5 %)	84 (42.9 %)	52 (34.4 %)	258 (39.8 %)
Ph.D. student/grad.	1 (0.7 %)	0 (0.0 %)	3 (1.5 %)	2 (1.3 %)	6 (0.9 %)
Employment					
Employed	81 (55.5 %)	129 (83.2 %)	130 (66.3 %)	130 (86.1 %)	470 (72.5 %)
Student	11 (7.5 %)	6 (3.9 %)	41 (20.9 %)	11 (7.3 %)	69 (10.7 %)
Homemaker	18 (12.3 %)	13 (8.4 %)	9 (4.6 %)	5 (3.3 %)	45 (6.9 %)
Maternity leave	23 (15.8 %)	0 (0.0 %)	9 (4.6 %)	1 (0.7 %)	33 (5.1 %)
Unemployed/ disability	13 (8.9 %)	7 (4.5 %)	5 (2.6 %)	4 (2.6 %)	29 (4.5 %)

Moldovan, and other ethnic groups, and reported high school or a higher education level. As it was expected based on the regional demographic characteristics, women in St. Petersburg were more likely to report higher education, urban residence, higher income compared, and less likely to work for wages compared to the NNR participants. As expected, there was a greater aggregate of married or cohabitating women among pregnant participants.

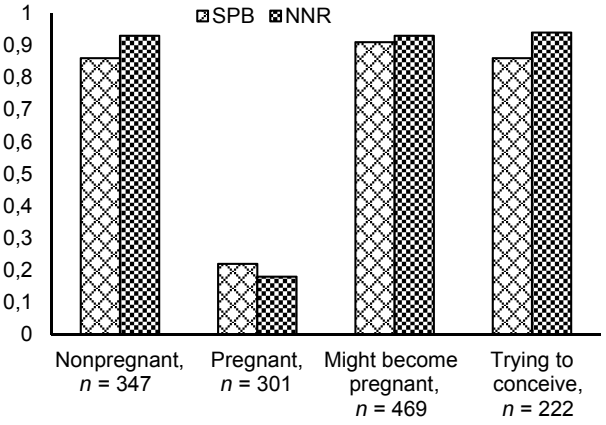

Fig. 1. Any alcohol use.

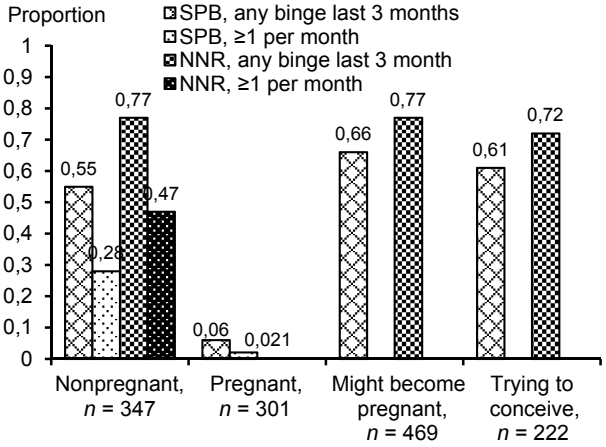

Fig. 2. Binge drinking.

Data on pregnant and non-pregnant women's alcohol consumption and included in Figures 1 and 2. Across both locations, non-pregnant women's reports about their drinking indicated that 89 % (93 % in NNR and 86 % in SPB) drank some amount of alcohol and 65 % (77.5 % in NNR and 54.5 % in SPB) reported binge episodes in the last three months. The significant differences between NNR and SPB women's average weekly consumption (2.60 drinks/week in NNR and 2.06 in SPB) and frequencies of binge drinking indicated higher consumption among non-pregnant women in NNR ($p < 0.05$). Notably, 47 % of non-pregnant women in NNR and 27.6 % in SPB reported having binges once a month or more, which included 27.2 % in NNR and 13.3 % in SPB who binged once a month, 10.6 % in NNR and 9.7 % in SPB two to three times a month, 7.9 % in NNR and 2.1 % in SPB once a week, and 1.3 % in NNR and 2.5 % in SPB several times a week. Among women who were actively trying to become pregnant 61 % in SPB and 72 % in NNR reported binge drinking in the last three months.

As expected, **pregnant women** in both study locations reported lower prevalence and amounts of alcohol consumption compared to non-pregnant women (see Fig. 1, 2). Differences between pregnant and non-pregnant groups were significant for drinking prevalence [z (n = 626) = 2.30, $p < 0.03$] and weekly amounts for drinkers only and the full sample of women [z (n = 351) = 2.79, $p < 0.01$ and z (n = 626) = 2.90, $p < 0.01$, respectively]. Of pregnant women, 18 % in NNR and 22 % in SPB reported consuming alcohol. More details were included elsewhere [3]. Pregnant women were asked to report the frequency of binge drinking after pregnancy recognition. No one in the NNR sample reported a binge occasion, while 5.6 % [95 % C.I. = (0.03,0.11)] of the SPB sample reported at least one event, including 3.5 % reporting binges less than once a month, 0.7 % – once/month, 0.7 % – 2 to 3 times a month, and 0.7 % – several times a week. These numbers are clearly lower than those reported prior to pregnancy; 65 % of pregnant women in SPB and 43 % in NNR reported binge drinking in the last three months before the pregnancy. Differences in pregnant women's consumption between the two study locations were not significant, possibly due to the relatively small numbers of pregnant drinkers. Comparison of pregnant women's risk for AEP across locations indicated a significantly higher proportion of pregnant women in SPB screening at-risk for prenatal alcohol exposure-on the screening measures (T-ACE and TWEAK-Hold) compared to NNR pregnant women.

Based on the structure of the interview with pregnant women, which assessed both drinking before pregnancy and current drinking, a similar comparison can be made within-subjects for the pregnant sample: 80 % of pregnant women retrospectively reported alcohol use in the three months prior to the pregnancy recognition compared to 20 % reporting alcohol use after the pregnancy identification. Poisson models predicted a significant, subject-specific 68 % decrease in drinking amount among women who continued to drink during pregnancy [z (n = 242) = –12.41, $p < 0.01$] and 91 % decrease in amount of weekly drinking for the full sample of pregnant women [z (n = 301) = –7.68, $p < 0.01$]. More details are included elsewhere [3]. As we reported previously, women who continued drinking during pregnancy were those who were drinking more prior to pregnancy; however, they decreased their drinking amounts substantially after the pregnancy recognition. In summary, the between group and within group analyses strongly suggest a decline in drinking after pregnancy recognition in both study locations.

Pregnancy possibility or risk for an unplanned pregnancy. In the subset of non-pregnant women (n = 347), 44 % in SPB and 70 % in NNR met criteria for pregnancy "risk" (i.e., intercourse once or more without any contraception in the last six months). The difference between the study locations in the proportion at-risk for pregnancy was significant, indicating lower contraception use and, therefore, higher probability and the risk for unplanned pregnancies in NNR compared to SPB ($p < 0.01$). Among non-pregnant and pregnant women in the sample,

the most prevalent reasons for not using contraception were trying to conceive (endorsed by 34.3 % of women in the total sample), less enjoyment of sex (12.8 %), trouble remembering/not having contraception at the time (11.5 %), partner's unwillingness to use contraception (10.9 %), side effects (6 %), not available at time (4.9 %), drinking and not thinking about contraception (3.7 %), not easily accessible or too expensive (1.9 %), believing that it is ineffective (1.1 %), or against the woman's religion/moral beliefs (0.5 %). More details are available elsewhere [2, 3].

Notably, among pregnant women, only 59 % in SPB and 65 % in NNR reported trying to get pregnant during the six months prior to the pregnancy, indicating that 41 % of pregnancies in SPB and 35 % in NNR were unplanned.

The prevalence of at-risk drinking measured by T-ACE, TWEAK-High, and TWEAK-Hold was reported elsewhere [2]. Interaction terms comparing proportions of at-risk drinking measured by T-ACE, TWEAK-High, and TWEAK-Hold in the full sample and subgroups of women trying to conceive and not using contraception because of other reasons were non-significant suggesting that women who are at-risk for pregnancy do not reduce their drinking and have drinking patterns similar to those in women who are not at-risk for pregnancy.

Pregnancy by location interactions were detected in the at-risk for pregnancy subsample for TWEAK-High [z (n = 468) = 2.62, p < 0.01] and binge measures [z (n = 468) = 2.00, p < 0.01], and location main effects for T-ACE [z (n = 468) = –3.39, p < 0.01] and TWEAK-Hold [z (n = 466) = –4.61, p < 0.01]. These main effects and interactions detected a higher proportion of at-risk drinking among women who were at-risk for pregnancy in SPB compared to NNR. Like the total at-risk pregnancy sample, location main effects for T-ACE [z (n = 222) = –3.16, p < 0.01] and both TWEAK-High [z (n = 222) = –2.04, p < 0.05] and TWEAK-Hold [z (n = 220) = –4.49, p < 0.01] suggested higher prevalence of at-risk consumption among trying to conceive women in SPB.

Risk for AEP. Based on contraception use and at-risk alcohol consumption criteria, 32 % of currently non-pregnant women in SPB and 54 % in NNR were at risk for AEP (see Fig. 3 for details).

Retrospective reports by pregnant women about their drinking in the three months prior to pregnancy were compared with concurrent non-pregnant women's reports. The analysis of prevalence and amounts of consumption showed differences in alcohol consumption depending on location and report type. Statistical tests suggested a reliable interaction between location and report type (retrospective vs. concurrent) for both prevalence [z (n = 619) = 3.14, p < 0.01] and consumption amounts for the full subsample of pregnant women and pregnant drinkers only [z (n = 619) = 5.35, p < 0.01 and z (n = 528) = 3.66, p < 0.01, respectively]. Retrospective reports by pregnant women about their drinking prior to pregnancy showed lower weekly consumption of 1.53 drinks/week in NNR compared to 2.31 in SPB (p < 0.05). Strata variability in proportions of drinkers showed a significant pregnancy-status main effect [z (n = 450) = 3.04, p < 0.01], indicating that pregnant women were less likely to acknowledge alcohol use in the 3 months before the pregnancy compared to current reports by non-pregnant women who are currently at-risk for pregnancy. However, it differed across the study locations. While in NNR, pregnant women's retrospective reports about their pre-pregnancy drinking were significantly lower than non-pregnant women's concurrent reports for weekly amounts [1.53 vs. 2.60, respectively, (p < 0.05)], proportion of drinkers [77 % vs. 93 % (p < 0.05)], and proportion of binge drinkers [43 % vs 77 %, p < 0.05], in SPB, pregnant women's retrospective reports did not differ from non-pregnant women's concurrent reports. More details are included elsewhere [3].

Comparison of four measures of alcohol use showed that proportions of women reporting at-risk drinking while non-pregnant using BSW, TWEAK, T-ACE, and binge drinking ranged from 2 % (BSW), to 23 % (TWEAK-High), 42 % (TWEAK-Hold), 55 % (T-ACE), and 60 % (binge drinking) in the total sample of women. The single binge question (frequency of drinking four or more drinks on one occasion in the last three months) was the most sensitive measure of at-risk alcohol consumption. More details on comparison of three measures of alcohol use and the utility of a single binge drinking question to identify Russian women at risk for an alcohol-exposed pregnancy were reported elsewhere [4].

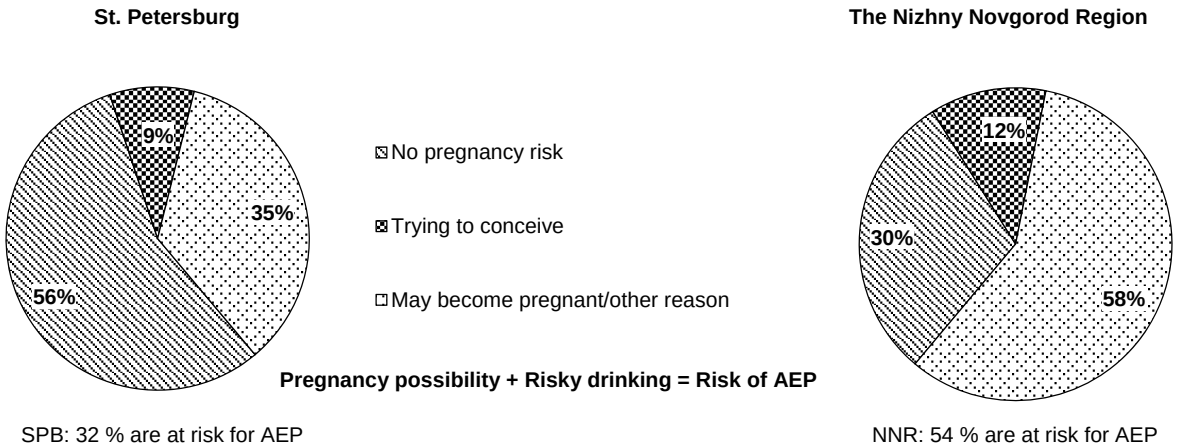

Fig. 3. Pregnancy planning, the risk for unplanned pregnancies, and prenatal alcohol exposure.

Comparison of study locations: consumption and pregnancy risk in St. Petersburg and the Nizhniy Novgorod region. As described above, differences in alcohol consumption among women at the two study locations depended on the report-type (current or retrospective) and pregnancy status (non-pregnant or pregnant). The currently non-pregnant women of NNR reported drinking more on average and more frequent binge episodes than their SPB non-pregnant counterparts (Fig. 1, 2). Contrarily, pregnant women's retrospective reports about pre-pregnancy drinking showed significantly less consumption amounts in NNR than in SPB. NNR retrospective reports of drinking, in general, were lower than the reports from NNR current non-pregnant women's reports, and these differences were often statistically significant. There were no significant differences between concurrent and retrospective reports about consumption in SPB women. A similar pattern existed in the alcohol screening measures data, where NNR pregnant women's retrospective at-risk drinking prior to pregnancy proportions fell below most other strata estimates and were often significantly lower than NNR non-pregnant women's current reports. Overall, at-risk drinking proportions were usually lower for retrospective reports in NNR women. There were no significant differences in pregnant women's consumption between the two locations; however, as described above, there were slightly higher numbers of pregnant drinkers and pregnant binge drinkers in SPB compared to NNR and screening measures (T-ACE and TWEAK-Hold) indicated greater risk among SPB pregnant women.

DISCUSSION

Results from this survey of 648 Russian women recruited at OB/GYN clinics in St. Petersburg and the Nizhny Novgorod Region highlight a number of findings related to the FASD risk in Russia. Drinking is a norm among Russian women with 89 % of non-pregnant women in the sample reporting drinking to some extent and 65 % reporting binge drinking in the last three months, including 47 % in NNR and 28 % in SPB having binges at least once a month. These results are commensurate with increased drinking among women reported by government statistics.

As expected, many Russian women significantly reduce or stop drinking once they are identified as pregnant; however, around 20 % of women reported drinking to some extent after pregnancy recognition. Any alcohol consumption during pregnancy is concerning, particularly the continuing binge drinking after pregnancy recognition reported by 6 % of pregnant women in SBP.

The reductions in consumption, however, are not evident prior to pregnancy identification, either when a woman is at-risk for pregnancy or when a woman is intentionally trying to become pregnant. The study indicates that these women consume alcohol at approximately the same rate and amount as women who are not at-risk for pregnancy, i.e., using contraception consistently.

Recent research highlights strong associations between at-risk drinking and other health risk behaviors in men and women. Although establishing causality is a challenge, hazardous drinking is the major factor contributing to risky sexual behaviors, including having multiple sexual partners and other behaviors that increase the risk for acquiring STDs. Reports indicate increasing prevalence of both, at-risk drinking and sexual risk behaviors/HIV in young women in many countries. Alcohol misuse is prevalent among people living with HIV and is associated with poor medication adherence, deteriorated health and life outcomes, and increased risk for HIV transmission. Studies identified at-risk drinking as a major factor associated with the risk for HIV and STIs in Russia [1].

Another concern for women's and children's health is the strong association between alcohol use and smoking, including in Russian women [15]. Smoking is prevalent among women of childbearing age in Russia; its prevalence is even higher among women who drink at-risk which raises concerns of dual risk for prenatal exposure to alcohol and tobacco in Russian children [3].

Widespread binge drinking, along with a high proportion of women "at-risk" for both planned and unintended pregnancies, constitute a substantial risk for AEP. Overall, the data indicate that women in Russia who may or try to become pregnant do not reduce alcohol consumption, their drinking patterns are similar to those in women who are not at-risk for pregnancy until pregnancy identification which presents significant risk for prenatal alcohol exposure early in pregnancy.

A number of limitations should be borne in mind when considering these findings. Women who are not receiving medical care and may be at highest risk for AEP were not represented in the sample because participants were recruited from public women's clinics. However, statistical reports indicate that the majority of women attend public women's clinics in Russia. It is clear that there are differences in drinking patterns and reductions in drinking after pregnancy identification between the SPB and NNR sites. Although the two research locations represent an inner city and a mix of urban and rural population in Russia, the findings might vary at other locations. Another limitation is that data were derived from women's self-reports and it is unknown how their answers may have been influenced by desirability bias; more details are included elsewhere [2, 3].

In support of the data validity, alcohol consumption among non-pregnant women does not seem to be stigmatized in Russia and even women attempting to become pregnant were reporting alcohol consumption. Several measures, including conducting face-to-face interviews by the same gender and age interviewers, interviewing at a health care setting, and creating an atmosphere conducive to openness, were employed in the study to elicit more accurate self-reports about drinking. It should be noted that a higher proportion of NNR women, including those who were trying to conceive, admitted consuming alcohol and larger amounts in current reports than was indicated by pregnant women's retrospective reports. One possible explanation could be that pregnant women in NNR represented a different group of women in NNR who were drinking less prior to the pregnancy compared to women who did not become pregnant. That explanation could be supported by the fact that pregnant women in NNR were more likely to be married/living with a partner compared to non-pregnant women. However, the same pattern was found in the SPB sample where there were

no differences between pregnant women's retrospective reports and non-pregnant women's concurrent reports. Another explanation could be that in a more rural and traditional population of NNR, retrospective reports about pre-pregnancy drinking might be more influenced by desirability bias than current reports. This finding indicates that in some groups, women's reports about pre-pregnancy alcohol consumption should be viewed with caution and suggests that retrospective self-reports about pre-pregnancy drinking may be more influenced by bias in some communities than in others.

The study findings have a number of implications for the prevention of AEP in Russia. The high proportion of Russian women at risk for AEP constitutes a substantial risk for fetal alcohol exposure early in pregnancy and indicates that primary prevention targeting at-risk women may be a promising strategy for FASD prevention in Russia. Behavior changes occur to reduce or stop drinking during pregnancy; however, these changes only occur when women recognize their pregnancy. This is concerning given that this time may be particularly sensitive to teratogenic insults on fetal development [8, 12]. The emphasis on targeting the preconception period in FASD prevention suggested by Floyd et al. [6] appears particularly germane for the Russian context.

It is important to note that alcohol consumption among Russian women does appear to be a self-modifiable behavior for many women. From the previous focus group information, reducing or stopping drinking appears to be related to health beliefs about pregnancy. Although there may be a small number of alcoholic women for whom stopping or cutting down is unlikely, many Russian women reduce their drinking routinely during pregnancy because they believe this is part of a healthy lifestyle. It seems reasonable to presume that these women would be able to quit or cut down when planning a pregnancy by expanding their current behavioral change mechanisms and health behavior beliefs backward in time to cover the pre-conceptual period. Although many Russian women reduce alcohol consumption after pregnancy identification, few recognize the risks involved in combining alcohol use with the potential to become pregnant and are therefore at risk for AEP. This suggests a ready target for population-based public health prevention work. It is possible that by extending beliefs about the time of stopping drinking to the point of pregnancy planning rather than pregnancy identification could result in a meaningful reduction in AEP.

Research indicates that the most influential contributor to Russian women's decisions regarding alcohol use during pregnancy is their «own knowledge» followed by information from an obstetrician/gynecologist or nurse [2]. Physicians' recommendations and research data were the most believable sources of information. It is important to women that obstetrics/gynecology professionals are knowledgeable about the effects of drinking during pregnancy and that their husbands/partners are informed and supportive of alcohol abstinence during pregnancy. Therefore, education for physicians and prevention interventions delivered by physicians are promising strategies in reducing women's at-risk drinking.

In line with research in other countries, brief and simple screening tools are effective to screen women for unhealthy alcohol use. A single question about binge drinking was effective in identifying 99 % of women who were at risk of alcohol-exposed pregnancies [4]. Physician training and implementation studies indicate that medical students and physicians can learn the skills necessary for screening and conducting the brief interventions in medical settings. Research studies indicate that Russian OB/GYN physicians can implement an alcohol screening and brief intervention successfully. Although some physicians and other health practitioners may feel discomfort asking a woman about her alcohol consumption or discussing prenatal alcohol exposure with the parents of a child, it is imperative for both prenatal and postnatal care for reducing alcohol consumption and preventing the risk for prenatal alcohol exposure and is necessary for diagnosing FASD in children.

CONCLUSION

It is imperative that medical education, routine health care at OB/GYN clinics and other medical settings that treat women of childbearing age address alcohol misuse in order to improve women's health and the health of children in Russia. It is recommended that brief interventions for at-risk drinking and the risk for alcohol-exposed pregnancies be implemented in OB/GYN, pediatric, primary care, and other medical settings. Women who have difficulty reducing their alcohol use and are in need of more extensive services for specialized treatment should be referred to counselling, therapy, or other services. Additional research is needed to design integrated multi-target interventions that reduce the harm caused by alcohol misuse and other health risk behaviors that are often associated with risky drinking, such as smoking and sexual risk behaviors.

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Conflict of interest

The authors declare that they have no conflict of interest.

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