Cardiovascular Therapy and Prevention. 2021;20(4):2883.
doi:10.15829/1728-8800-2021-2883
ISSN 1728-8800 (Print)
ISSN 2619-0125 (Online)

Association of alcohol consumption and dietary patterns in the adult population: data from the ESSE-RF study

Karamnova N.S., Rytova A.I., Shvabskaya O.B., Shalnova S.A., Maksimov S.A., Balanova Yu.A., Evstifeeva S.E., Imaeva A.E., Kapustina A.V., Muromtseva G.A., Drapkina O.M.

National Medical Research Center for Therapy and Preventive Medicine. Moscow, Russia

The alcohol consumption is associated with dietary patterns.

Aim. To study the associations of alcohol consumption and dietary patterns in the adult population.

Material and methods. The analysis was carried out using representative samples of male and female population aged 25-64 years (n=19437; men, 7306; women, 12131 women) from 13 Russian regions. The response rate was 80%. We assessed nutrition by the frequency of consuming basic food groups. The low alcohol intake (LI) category includes women and men who consume <42 g and <84 g, moderate consumption (MI) — 42 g and 84 g, high intake (HI) — 84 g and 168 g ethanol per week, respectively.

Results. In comparison with men who do not drink alcohol, MI and HI category representatives more often consume red meat — by 22 and 36%, meat and sausages — by 37 and 48%, and less often: fish products — by 34 and 33%, cottage cheese — by 51 and 53%, respectively. More rare consumption of poultry is significant in the MI group, vegetables/fruits — in the HI group, sweets — in the LI group. Consumption of pickles, cereals, pasta, liquid dairy products, cheese and sour cream does not differ between the groups in men. Compared to women who do not drink alcohol, women in the LI, MI and HI groups significantly more often consume meat and sausages — by 16, 28 and 85%, respectively. Women of the LI and MI groups more often consume red meat — by 15 and 33%, confectionery — by 29 and 24%, less often: cereals — by 9 and 18%, legumes — by 44 and 53% and cottage cheese — by 19 and 44%, respectively. Women of the LI category more often daily consume milk, kefir and yogurt — by 26%, and less often fish products — by 18%. Women of the HI group are less likely to consume fruits/vegetables. Consumption of poultry, pickles and cheese do not differ between groups among women.

Conclusion. People who consume alcoholic beverages have a pronounced nutritional imbalance, characterized by a higher consumption of red meat, especially processed, high-fat dairy products, salt, and in women, confectionery.

Keywords: dietary pattern, eating habits, alcohol consumption, alcohol, ESSE-RF study.

Relationships and Activities: none.

Karamnova N.S.* ORCID: 0000-0002-8604-712X, Rytova A.I. ORCID: 0000-0003-2871-4593, Shvabskaya O.B. ORCID: 0000-0001-9786-4144, Shalnova S.A. ORCID: 0000-0003-2087-6483, Maksimov S.A. ORCID: 0000-0003-0545-2586, Balanova Yu.A. ORCID: 0000-0001-8011-2798, Evstifeeva S.E. ORCID: 0000-0002-7486-4667, Imaeva A.E. ORCID: 0000-0002-9332-0622, Kapustina A.V. ORCID: 0000-0002-9624-9374, Muromtseva G.A. ORCID: 0000-0002-0240-3941, Drapkina O.M. ORCID: 0000-0002-4453-8430.

*Corresponding author:
nkaramnova@gnicpm.ru

Received: 13/04-2021
Revision Received: 23/05-2021
Accepted: 25/05-2021

For citation: Karamnova N.S., Rytova A.I., Shvabskaya O.B., Shalnova S.A., Maksimov S.A., Balanova Yu.A., Evstifeeva S.E., Imaeva A.E., Kapustina A.V., Muromtseva G.A., Drapkina O.M. Association of alcohol consumption and dietary patterns in the adult population: data from the ESSE-RF study. *Cardiovascular Therapy and Prevention*. 2021;20(4):2883. (In Russ.) doi:10.15829/1728-8800-2021-2883

In 2016, alcohol consumption was noted by experts as the seventh most important risk factor (RF) contributing to the all-cause mortality and loss of healthy life years of the population aged 15-49 years [1]. Resuming the results of the systematic reviews, some researchers conclude that "no level of alcohol consumption improves health" [2], despite the fact that many large-scale studies demonstrate different alcohol contributions to prognosis and life status. Moderate alcohol consumption was considered as protective against cardiovascular disease (CVD), while high consumption increased the risk of morbidity and mortality for all noncommunicable diseases. However, according to some authors, the protective effect of moderate alcohol consumption is leveled by the damaging effect and high risk of cancer [2]. The adverse alcohol effects are exacerbated by poor eating habits, which are often associated [3].

Some studies indicate that the alcohol consumption significantly affects the dietary pattern [4-7]. The results show a direct relationship between the level of alcohol consumption and dietary imbalance degree, expressed in increased consumption of animal fats, salt, saturated fatty acids and low intake of dietary fiber, calcium, monounsaturated fats [4-7]. Researchers note that with an increase in alcohol consumption, the frequency

and proportion of consuming protective foods, such as vegetables and fruits, whole grains, low-fat dairy products, decrease, while there is a higher level of consuming animal products, coffee, tea and potatoes [4, 5]. Some researchers identify certain dietary patterns associated with the predominant consumption of a particular alcoholic beverage [8, 9]. The Danish study found the largest differences in eating habits between people who preferred wine and those who preferred beer. The beer drinkers consumed more meat, soft drinks, margarine, and savory snacks. At the same time, people who prefer wine had healthier habits, more often consumed vegetables and fruits, and had a lower energy content of the diet compared to beer drinkers [8]. In the Spanish study, wine drinkers had higher intake of dietary fiber and olive oil, as well as lower consumption of total fat, dairy products, sugar-sweetened beverages, and fast food compared to those who consume other alcoholic beverages. and non-drinkers [9]. However, the systematic review, studying the association of alcohol consumption and types of food, which included 16 studies in the analysis, demonstrated that the alcohol choice specifies the initial type of a person's diet, and not vice versa [10]. Some researchers have suggested that the observed differences in associations between the consumption of wine, beer and other alcoholic beverages and mortality may be due to concomitant eating habits, which differ depending on the type of drink consumed. However, most studies examining the relationship between alcohol consumption and lifestyle focus on alcohol consumption in general [7, 11, 12].

One way or another, the authors of all studies note the presence of a relationship between the dietary pattern and alcohol consumption. However, the population characteristics of these associations differ between countries, which determined the conduction of this study.

The aim was to study the associations of alcohol consumption and dietary patterns in the adult population of Russia.

Material and methods

The material was representative samples of male and female population aged 25-64 years (n=22217; men, 8519; women, 13698) from 13 Russian regions (Voronezh, Ivanovo, Volgograd, Vologda, Kemerovo, Tyumen Oblasts; cities of Samara, Orenburg, Vladivostok, Tomsk and St. Petersburg, the Republic of North Ossetia-Alania, Krasnoyarsk Krai), examined within the ESSE-RF multicenter epidemiological study. The study was approved by ethics committees of all participating centers. All participants signed informed consent. The response was ~80% [13].

To assess nutrition and eating habits, a questionnaire was used on the frequency of intake of 13 main food groups (red meat, poultry, fish and seafood, processed meat, pickles and marinades, cereals and pasta, raw vegetables and fruits, legumes, confectionery, dairy products (milk, kefir, yogurt, sour cream/cream, cottage cheese, cheese)). Four criteria for the consumption frequency were used: "not consume/rarely"; "1-2 times a month"; "1-2 times a week" and "daily/almost daily". Dairy products by fat content were grouped according to the criteria of Russian regulatory documents [14]. The criteria for assessing the adequacy of consumption and compliance with a healthy diet were determined according to the World Health Organization guidelines [15].

Consumption of confectionery, sweets, and/or daily consumption of >12 tsp/raw sugar lumps were considered "too much added sugar". Excessive salt intake was found in the case of the simultaneous presence of 2 of 3 following elements in the diet: daily consumption of processed meat; daily consumption of pickles and marinades; adding salt to food after cooking.

Alcohol consumption was assessed by the frequency and intensity of its usual intake once and per week. The following types of alcoholic beverages were evaluated: beer, dry wines and champagne, fortified wines, house wines and liqueurs, spirits (vodka, cognac, etc.). Additionally, the calculation of ethanol consumption per day was carried out in total from each type of alcoholic beverages. The "low intake (LI)" category included women consuming <42 g and men consuming <84 g ethanol per week; "moderate intake (MI)" — women consuming 42 g and men consuming 84 g of pure ethanol per week; "high intake (HI)" — women consuming 84 g and men consuming 168 g of pure ethanol per week.

Within this publication, statistical analysis was carried out using a cohort of respondents with complete data on dietary pattern (n=19437; men, 7306; women, 12131).

There were gaps in the answers about alcohol consumption. To recover the missing data in the answers to the questions "How often do you drink alcohol?" and "How much do you usually drink in one meal?" data recovery algorithm was used. For each category of alcoholic beverages, a table was formed with the columns "sex", "age group", "education status", "type of residence", "average consumption frequency per week", "average quantity in ml per one meal". Every possible combination of values in the first four columns identified a subgroup to which the respondents might belong. For each subgroup, the mean values indicated in the last two columns were calculated. In the case when the respondent missed the answer to the question "How often do you drink alcohol?" or "How much do you usually drink in one meal?", the missing value was restored by the average of the column "Average consumption frequency per week" or "average quantity in ml per one meal", respectively, from the subgroup to which the respondent belonged.

Statistical analysis was performed using the Scipy 1.1.0, NumPy 1.14.3 libraries for Python 3.6.5 (Python Software Foundation, Delware, USA) and free R 3.6.1 environment. We calculated the mean and 95% lower and upper confidence intervals (CI) of the mean. To study the hypothesis on the trend in the transition from the "no intake (NI)" group to the LI, MI, and HI groups, the Cochran-Armitage and Jonckheere's trend tests were used for binary and continuous data, respectively. The equality hypothesis was tested using the Kruskal-Wallis test. Multiple logistic regression was performed with adjustments for age, marital status, educational status, income, type of residence, and smoking status. The continuous variable "Age" was divided into 4 groups by decades ("25 years — 34 years" — the reference group, "35 years — 44 years", "45 years — 54 years", "55 years — 64

Table 1

Characteristics of the participants

	NI, n=4155		LI, n=12791		MI, n=1786		HI, n=705	
	n	%	n	%	n	%	n	%
Men	1201	16,4	4509	61,7	1118	15,3	478	6,5
Women	2954	24,4	8282	68,3	668	5,5	227	1,9
Age groups								
25-34 years old	654	16,0	2759	67,7	499	12,2	166	4,1
35-44 years old	661	17,2	2481	64,5	491	12,8	212	5,5
45-54 years old	1149	21,0	3614	66,2	494	9,0	205	3,8
55-64 years old	1691	27,9	3937	65,1	302	5,0	122	2,0
Educational status								
Below the secondary	244	28,9	464	55,0	75	8,9	60	7,1
Secondary	2308	22,8	6488	64,0	947	9,3	400	3,9
Above the secondary	1603	19,0	5839	69,1	764	9,0	245	2,9
Residence type								
City	3182	20,2	10538	66,9	1460	9,3	567	3,6
Village	973	26,4	2253	61,1	326	8,8	138	3,7
Marital status								
Single	611	21,5	1884	66,4	250	8,8	93	3,3
Married	2538	20,2	8256	65,9	1269	10,1	473	3,8
Divorced	538	21,1	1681	65,9	225	8,8	106	4,2
Widowed	437	31,6	876	63,4	38	2,7	31	2,2
Income								
Very low	398	36,8	596	55,1	55	5,1	33	3,0
Low	1360	25,6	3404	64,0	387	7,3	164	3,1
Moderate	1680	19,5	5813	67,6	817	9,5	292	3,4
High	626	16,1	2608	67,3	457	11,8	186	4,8
Very high	65	14,3	297	65,6	63	13,9	28	6,2
Region								
Primorsky Krai	590	34,6	914	53,6	158	9,3	42	2,5
Republic of North Ossetia-Alania	843	53,0	646	40,6	60	3,8	42	2,6
Ivanovo Oblast	194	11,1	1293	73,8	189	10,8	75	4,3
Tyumen Oblast	257	18,3	1026	73,0	80	5,7	42	3,0
Vologda Oblast	243	16,3	1010	67,6	193	12,9	49	3,3
Kemerovo Oblast	218	13,9	993	63,5	270	17,3	84	5,4
Tomsk Oblast	168	11,7	1000	69,7	163	11,4	103	7,2
Samara Oblast	274	17,8	1080	70,3	143	9,3	40	2,6
Saint Petersburg	130	9,0	1099	75,7	144	9,9	79	5,4
Orenburg Oblast	290	20,6	1018	72,3	65	4,6	35	2,5
Krasnoyarsk Krai	225	16,2	933	67,4	189	13,6	38	2,7
Voronezh Oblast	420	28,0	984	65,6	67	4,5	28	1,9
Volgograd Oblast	303	25,0	795	65,6	65	5,4	48	4,0
Smoking status								
Never	2989	25,4	8011	68,0	596	5,1	180	1,5
Former	556	16,4	2182	64,3	474	14,0	183	5,4
Current	610	14,3	2598	60,9	716	16,8	342	8,0
Ethanol consumption level, g per week								
	M	95% CI	M	95% CI	M	95% CI	M	95% CI
Men	0	0,0-0,0	32,8	32,1-33,5	116,9	115,5-118,3	320,3	299,9-340,8
Women	0	0,0-0,0	10,8	10,6-11,1	57,4	56,5-58,2	181,7	156,7-206,6

Note: HI — high intake, CI — confidence interval, LI — low intake, NI — no intake, MI — moderate intake.

years") and was considered as a categorical. The results were considered significant at p<0,05.

Results

The characteristics of the surveyed patients are presented in Table 1. A fifth of the adult population does not consume alcohol at all (20,4%). Among the consumers, the main group consists of persons with LI (65,0%), MI — in 10,4% and HI — in 4,2% of Russians. Men consume alcohol more often and with higher intensity than women, and a decrease in consumption is observed with age. A higher proportion of NI individuals is noted among respondents with a low educational status, living in rural areas, with a low income, as well as among never smokers and widowed persons. HI is more often observed among men 35-44 years old, people with education below secondary, smokers, with high and very high-income level. Regional differences in rates are highly variable. Thus, the proportion of NI persons varies from 9,0 to 53,0%, the LI — from 40,6 to 75,5%, the MI — from 3,8 to 17,3%, and the HI — 1,9 to 7,2%. The NI group is the largest in the Republic of North Ossetia-Alania, and the smallest in St. Petersburg. The largest number of HI people is in the Tomsk region — 7,2 vs 1,9% in the Voronezh region.

Characteristics of consumption by frequency and quantity of certain alcohol types among men and women are presented in Table 2. Men more often prefer

Table 2

Frequency and intensity of alcohol consumption among participants

	Men							
	LI, n=4509		MI, n=1118		HI, n=478		p for trend*	Trend statistics
	M	95% CI	M	95% CI	M	95% CI		
Beer								
% of consumers	55,3		82,8		87,2		<0,0001	19,6
% of those using less than once a week	61,99		35,31		22,30		<0,0001	-18,4
Frequency of consumption, 1 time per week	0,7	0,68-0,72	1,26	1,18-1,35	2,59	2,33-2,85	<0,0001	
Amount for 1 meal, ml	735,2	718,3-752,0	1195,7	1154,4-1236,9	1601,2	1496,8-1705,5	<0,0001	
Amount per week, ml	493,7	477,9-509,5	1308,8	1257,1-1360,6	3280,3	2942,7-3617,9	<0,0001	
Dry wines, champagne								
% of consumers	42,5		41,4		39,1		0,137	-1,5
% of those using less than once a week	92,8		88,9		74,9		<0,0001	-7,7
Frequency of consumption, 1 time per week	0,30	0,28-0,31	0,45	0,38-0,52	0,96	0,69-1,23	<0,0001	
Amount for 1 meal, ml	258,7	251,8-265,6	366,9	341,8-391,9	539,6	467,3-611,9	<0,0001	
Amount per week, ml	74,2	70,5-77,9	153,4	135,1-171,8	429,2	320,8-537,6	<0,0001	
Fortified wines								
% of consumers	7,7		10,2		18,2		<0,0001	7,4
% of those using less than once a week	96,3		90,4		67,8		<0,0001	-7,7
Frequency of consumption, 1 time per week	0,21	0,18-0,23	0,31	0,24-0,39	1,37	0,87-1,87	<0,0001	
Amount for 1 meal, ml	215,4	200,8-230,0	293,4	260,7-326,1	492,6	392,6-592,7	<0,0001	
Amount per week, ml	40,9	36,1-45,9	87,2	66,7-107,7	511,0	327,7-694,4	<0,0001	
Homemade strong liqueurs								
% of consumers	6,5		11,9		21,8		<0,0001	11,8
% of those using less than once a week	90,5		84,3		65,4		<0,0001	-5,8
Frequency of consumption, 1 time per week	0,33	0,28-0,39	0,50	0,39-0,61	1,27	0,86-1,68	<0,0001	
Amount for 1 meal, ml	179,1	164,1-194,2	247,0	219,3-274,7	440,8	362,4-519,3	<0,0001	
Amount per week, ml	45,3	40,4-50,2	99,7	87,5-111,8	378,4	272,2-484,7	<0,0001	
Vodka, cognac, other strong beverages								
% of consumers	75,0		95,1		95,6		<0,0001	16,2
% of those using less than once a week	87,3		66,7		45,3		<0,0001	-23,4
Frequency of consumption, 1 time per week	0,43	0,42-0,45	0,80	0,74-0,85	1,49	1,30-1,67	<0,0001	
Amount for 1 meal, ml	185,8	181,9-189,8	309,4	299,5-319,3	481,8	444,7-518,8	<0,0001	
Amount per week, ml	72,6	70,7-74,6	204,3	197,5-211,1	493,7	446,7-540,7	<0,0001	
Women								
	LI, n=8288		MI, n=668		HI, n=227			
Beer								
% of consumers	35,9		71,9		71,8		<0,0001	19,6
% of those using less than once a week	85,7		62,1		38,7		<0,0001	-18,3
Frequency of consumption, 1 time per week	0,39	0,38-0,40	0,68	0,63-0,72	1,67	1,32-2,01	<0,0001	

Table 2. Continuation

	Men							
	LI, n=4509		MI, n=1118		HI, n=478		p for trend*	Trend statistics
	M	95% CI	M	95% CI	M	95% CI		
Amount for 1 meal, ml	487,8	476,5-499,2	1015,7	962,2-1069,3	1223,4	1080,8-1366,1	<0,0001	
Amount per week, ml	198,5	191,2-205,8	664,4	625,2-703,6	1613,2	1279,9-1946,5	<0,0001	
Dry wines, champagne								
% of consumers	70,7		61,7		61,2		<0,0001	-5,4
% of those using less than once a week	94,8		74,5		57,6		<0,0001	-22,3
Frequency of consumption, 1 time per week	0,23	0,22-0,23	0,50	0,43-0,58	1,23	0,88-1,59	<0,0001	
Amount for 1 meal, ml	220,1	216,8-223,3	391,7	364,9-418,3	457,4	399,7-515,1	<0,0001	
Amount per week, ml	50,5	49,1-51,9	174,7	157,5-191,9	439,8	312,1-567,4	<0,0001	
Fortified wines								
% of consumers	8,7		13,0		15,4		<0,0001	4,9
% of those using less than once a week	96,96		86,21		68,57		<0,0001	-8,1
Frequency of consumption, 1 time per week	0,17	0,16-0,18	0,31	0,25-0,37	1,13	0,39-1,87	<0,0001	
Amount for 1 meal, ml	176,8	168,3-185,4	257,3	229,4-285,1	381,3	289,2-473,4	<0,0001	
Amount per week, ml	30,2	27,4-32,9	75,6	60,3-90,9	240,2	125,4-354,9	<0,0001	
Homemade strong liqueurs								
% of consumers	5,7		16,6		23,4		<0,0001	14,4
% of those using less than once a week	97,5		88,3		49,1		<0,0001	-11,4
Frequency of consumption, 1 time per week	0,18	0,16-0,20	0,34	0,28-0,39	1,49	0,88-2,10	<0,0001	
Amount for 1 meal, ml	130,5	122,8-138,2	215,2	193,9-236,4	396,0	282,5-509,5	<0,0001	
Amount per week, ml	21,3	19,2-23,4	63,9	54,3-73,7	428,2	153,1-703,3	<0,0001	
Vodka, cognac and other strong beverages								
% of consumers	47,9		78,4		78,1		<0,0001	16,3
% of those using less than once a week	96,9		75,6		51,7		<0,0001	-28,1
Frequency of consumption, 1 time per week	0,22	0,22-0,23	0,48	0,43-0,53	1,44	1,12-1,77	<0,0001	
Amount for 1 meal, ml	118,8	116,5-121,2	239,4	226,4-252,5	341,3	293,1-389,5	<0,0001	
Amount per week, ml	25,6	24,9-26,4	93,4	88,1-98,7	290,7	239,9-341,5	<0,0001	

Note: * — to estimate the p for trend of consumers' proportion, the Cochran-Armitage test was used; in other cases — the Jonckheere's trend test. LI — low intake, CI — confidence interval, MI — moderate intake, HI — high intake.

strong drinks (vodka, cognac), beer and dry wines and to a lesser extent fortified wines and homemade liqueurs. These preferences are observed in all alcohol consumption categories in men. Women have a similar choice, but, unlike men, the preference for dry wines is shown by 1,5 times more Russian women — 64,5 vs 41,02%, and in the LI category, dry wine and champagne are the leaders in popularity of the drink. In men, there is a positive upward trend in amount of all alcohol types consumed, as well as in the proportion of consumers (except for the "dry wine" category), while the share of those who consume this drink less than once a week is decreasing. Among women, a similar situation is noted, with the only difference that the amount of drinking of all alcohol types is less than in men, and in the "dry wine" category, women have a significant downward trend in consumers' proportion.

The dietary pattern of both men and women changes depending on the alcohol consumption level, which is reflected in the change of the daily consumption of main food groups. Table 3 presents the characteristics of the daily consumption of main foods and individual dietary habits, depending on the category of alcohol consumption. In both men and women, with an increase in alcohol consumption, there are significant upward trends in consumption of red meat, processed meat, and added raw sugar. A similar situation is observed with respect to adding more salt to cooked foods, the insufficient consumption of raw vegetables and fruits, and the use of animal fats in cooking. With an increase in alcohol consumption without sex differences, significant negative trends in the consumption of raw vegetables and fruits, fish and seafood, legumes and cottage cheese are observed. In men, there is a decrease in the consumption of poultry, liquid dairy products (milk, kefir, yogurt, etc.), cheese and an increase in the consumption of pickles with an increase in alcohol consumption, in contrast to women who do not have such trends. However, among women, there are other dietary changes. With an increase in alcohol consumption, the intake of cereals and pasta decreases and the consumption of sweets/confectionery and dairy products (except for sour cream and cream) increases. Also, women have a pronounced upward trend of excess

Table 3

Daily dietary regimen, habits and patterns among participants with different levels of alcohol consumption

	Alcohol consumption													
	NI			LI			MI			HI			p for trend*	Trend statistics
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI		
Red meat														
Men	577	48	45,2-50,9	2324	51,5	50,1-53,0	627	56,1	53,2-59,0	278	58,2	53,7-62,6	<0,0001	4,71
Women	993	33,6	31,9-35,3	3237	39,1	38,0-40,1	297	44,5	40,7-48,2	93	41	34,5-47,4	<0,0001	5,93
Fish, seafood														
Men	148	12,3	10,5-14,2	526	11,7	10,7-12,6	96	8,6	6,9-10,2	42	8,8	6,2-11,3	0,0013	-3,22
Women	340	11,5	10,4-12,7	780	9,4	8,8-10,0	61	9,1	6,9-11,3	29	12,8	8,4-17,2	0,0502	-1,96
Poultry														
Men	325	27,1	24,5-29,6	1180	26,2	24,9-27,5	263	23,5	21,0-26,0	113	23,6	19,8-27,5	0,0305	-2,16
Women	818	27,7	26,1-29,3	2361	28,5	27,5-29,5	188	28,1	24,7-31,6	77	33,9	27,7-40,1	0,1337	1,49
Processed meat														
Men	294	24,5	22,0-26,9	1134	25,1	23,9-26,4	363	32,5	29,7-35,2	168	35,1	30,9-39,4	<0,0001	6,01
Women	513	17,4	16,0-18,7	1664	20,1	19,2-21,0	157	23,5	20,3-26,7	71	31,3	25,2-37,4	<0,0001	5,74
Pickles and marinades														
Men	147	12,2	10,4-14,1	462	10,2	9,4-11,1	136	12,2	10,2-14,1	75	15,7	12,4-19,0	0,0431	2,02
Women	303	10,3	9,2-11,4	741	8,9	8,3-9,6	60	9	6,8-11,2	26	11,5	7,3-15,6	0,283	-1,07
Cereals and pasta														
Men	527	43,9	41,1-46,7	1910	42,4	40,9-43,8	451	40,3	37,5-43,2	200	41,8	37,4-46,3	0,1563	-1,42
Women	1232	41,7	39,9-43,5	3267	39,4	38,4-40,5	247	37	33,3-40,6	86	37,9	31,5-44,2	0,0091	-2,61
Fresh vegetables and fruits														
Men	633	52,7	49,9-55,5	2312	51,3	49,8-52,7	529	47,3	44,4-50,2	196	41	36,6-45,4	<0,0001	-4,69
Women	1950	66	64,3-67,7	5491	66,3	65,3-67,3	403	60,3	56,6-64,0	125	55,1	48,5-61,6	0,0025	-3,02
Legumes														
Men	69	5,7	4,4-7,1	187	4,1	3,6-4,7	35	3,1	2,1-4,2	12	2,5	1,1-3,9	0,0003	-3,61
Women	214	7,2	6,3-8,2	327	3,9	3,5-4,4	21	3,1	1,8-4,5	12	5,3	2,4-8,2	<0,0001	-5,94
Sweets, confectionery														
Men	563	46,9	44,1-49,7	1929	42,8	41,3-44,2	502	44,9	42,0-47,8	198	41,4	37,0-45,9	0,1452	-1,46
Women	1346	45,6	43,8-47,4	4407	53,2	52,1-54,3	352	52,7	48,9-56,5	102	44,9	38,4-51,5	<0,0001	4,52
Milk, kefir, yogurt														
Men	554	46,1	43,3-49,0	2039	45,2	43,8-46,7	470	42	39,1-44,9	204	42,7	38,2-47,1	0,0377	-2,08
Women	1469	49,7	47,9-51,5	4639	56	54,9-57,1	335	50,1	46,3-54,0	101	44,5	38,0-51,0	0,0835	1,73
Sour cream, cream														
Men	247	20,6	18,3-22,9	942	20,9	19,7-22,1	235	21	18,6-23,4	99	20,7	17,1-24,4	0,8777	0,15
Women	651	22	20,5-23,5	1672	20,2	19,3-21,1	110	16,5	13,6-19,3	53	23,3	17,8-28,9	0,0237	-2,26
Cottage cheese														
Men	218	18,2	16,0-20,3	708	15,7	14,6-16,8	98	8,8	7,1-10,4	40	8,4	5,9-10,9	<0,0001	-7,38
Women	752	25,5	23,9-27,0	1767	21,3	20,5-22,2	89	13,3	10,7-15,9	37	16,3	11,5-21,1	<0,0001	-7,04
Cheese														
Men	445	37,1	34,3-39,8	1617	35,9	34,5-37,3	378	33,8	31,0-36,6	157	32,8	28,6-37,1	0,0395	-2,06
Women	1282	43,4	41,6-45,2	3659	44,2	43,1-45,2	284	42,5	38,8-46,3	95	41,9	35,4-48,3	0,8874	-0,14
Adding more salt to cooked food														
Men	534	44,5	41,6-47,3	2086	46,3	44,8-47,7	583	52,1	49,2-55,1	279	58,4	53,9-62,8	<0,0001	5,95
Women	1132	38,3	36,6-40,1	3499	42,2	41,2-43,3	311	46,6	42,8-50,3	128	56,4	49,9-62,9	<0,0001	6,24
Inadequate intake of vegetables/fruits														
Men	568	47,3	44,5-50,1	2197	48,7	47,3-50,2	589	52,7	49,8-55,6	282	59	54,6-63,4	<0,0001	4,69
Women	1004	34	32,3-35,7	2791	33,7	32,7-34,7	265	39,7	36,0-43,4	102	44,9	38,4-51,5	0,0025	3,02
Excess salt intake														
Men	719	59,9	57,1-62,6	2767	61,4	59,9-62,8	771	69	66,2-71,7	351	73,4	69,5-77,4	<0,0001	6,56
Women	1556	52,7	50,9-54,5	4627	55,9	54,8-56,9	408	61,1	57,4-64,8	162	71,4	65,4-77,3	<0,0001	6,04

Table 3. Continuation

	Alcohol consumption													
	NI			LI			MI			HI			p for trend*	Trend statistics
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI		
Excess sugar intake														
Men	604	50,3	47,5-53,1	2055	45,6	44,1-47,0	548	49	46,1-52,0	215	45	40,5-49,5	0,2763	-1,09
Women	1371	46,4	44,6-48,2	4490	54,2	53,1-55,3	361	54	50,3-57,8	106	46,7	40,2-53,2	<0,0001	4,84
Use of animal fats in food preparation														
Men	848	70,6	68,0-73,2	3466	76,9	75,6-78,1	848	75,8	73,3-78,4	373	78	74,3-81,8	0,0021	3,07
Women	2078	70,3	68,7-72,0	6354	76,7	75,8-77,6	497	74,4	71,1-77,7	175	77,1	71,6-82,6	<0,0001	5,09
Consumption of added raw sugar (teaspoon, cube)														
	M		95% CI	M		95% CI	M		95% CI	M		95% CI	P for trend**	
Men	6		5,7-6,3	5,83		5,7-6,0	6,55		6,2-6,9	6,8		6,3-7,3	<0,0001	
Women	4,1		4,0-4,2	4,41		4,3-4,5	4,26		4,0-4,6	4,45		3,9-5,0	0,0007	

Note: * — Cochran-Armitage test; ** — Jonckheere's trend test. LI — low intake, CI — confidence interval, MI — moderate intake, HI — high intake.

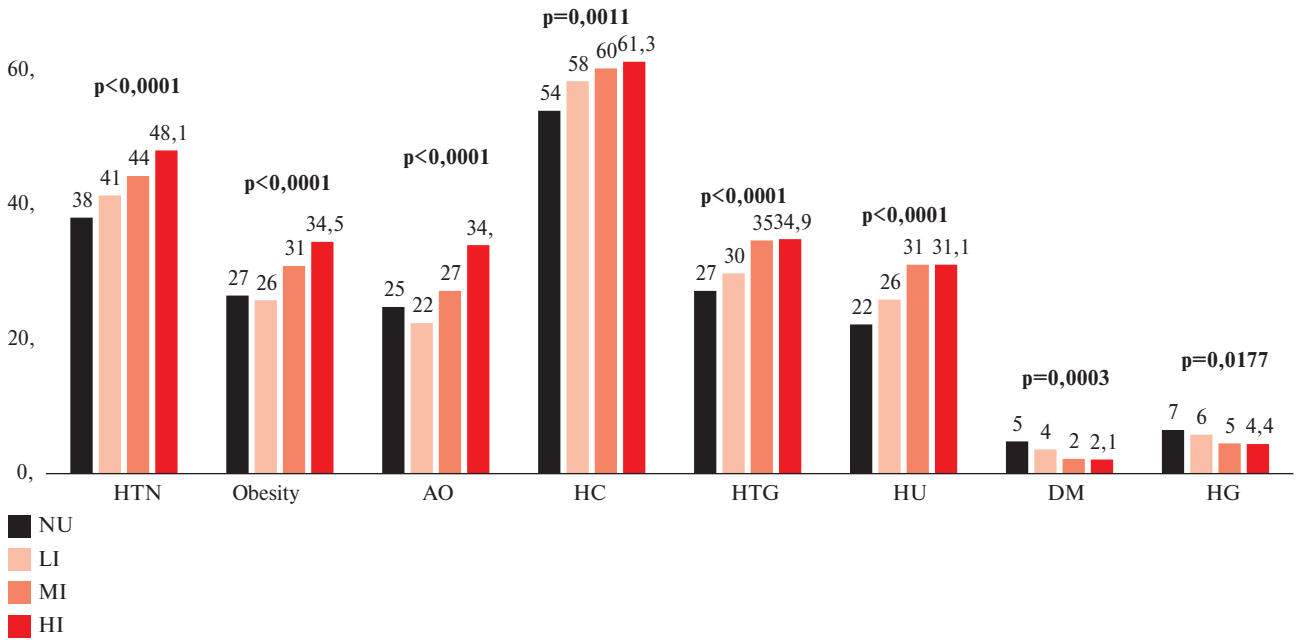

Figure 1 Prevalence of DRFs among men with different alcohol consumption levels.
Note: HTN — hypertension, AO — abdominal obesity, HI — high intake, HG — hyperglycemia, HTG — hypertriglyceridemia, HU — hyperuricemia, HC — hypercholesterolemia, LI — low intake, NU — do not use/do not us, no intake, DM — diabetes mellitus, MI — moderate intake.

sugar consumption, but only up to the HI category, among whom this parameter is similar to the NI group. The same situation is with the daily consumption of sour cream and cream, however, the trend in this case is decreasing.

Analysis of the logistic model showed that not all of the above differences in dietary pattern depending on alcohol consumption persist, but stable trends demonstrate reliable associations. Among all categories of alcohol consumption in men, only one eating habit stands out — the use of animal fats in cooking. So, in comparison with NI, men of the LI, MI and HI categories more often consume food prepared with animal fats (odds ratio (OR), 1,42; 95% CI: 1,23-1,64 (p<0,0001); OR, 1,36; 95% CI: 1;13-1;65 (p=0,0013); OR, 1,51; 95% CI: 1,17-1,94 (p=0,0016), respectively. The rest of the differences in diets regards only certain categories of alcohol consumption. Compared with NI individuals, men from the MI and HI groups more often consume red meat (OR, 1,22; 95% CI: 1,03-1,44 (p=0,0203); OR, 1,36; 95% CI: 1,09-1,69 (p=0,0059), respectively), processed meat (OR, 1,37; 95% CI: 1,14-1,65 (p=0,001); OR, 1,48; 95% CI: 1,17-1,87 (p=0,0011), respectively), add salt to cooked food (OR, 1,26; 95% CI: 1,07-1,5 (p=0,0063); OR, 1,52; 95% CI: 1,22-1,89 (p=0,0002), respectively) and less often consume fish products (OR, 0,66; 95% CI: 0,5-0,88 (p=0,0038); OR, 0,67; 95% CI: 0,47-0,97 (p=0,0336), respectively), legumes (OR, 0,58; 95% CI: 0,38-0,89 (p=0,0124); OR, 0,44; 95% CI:

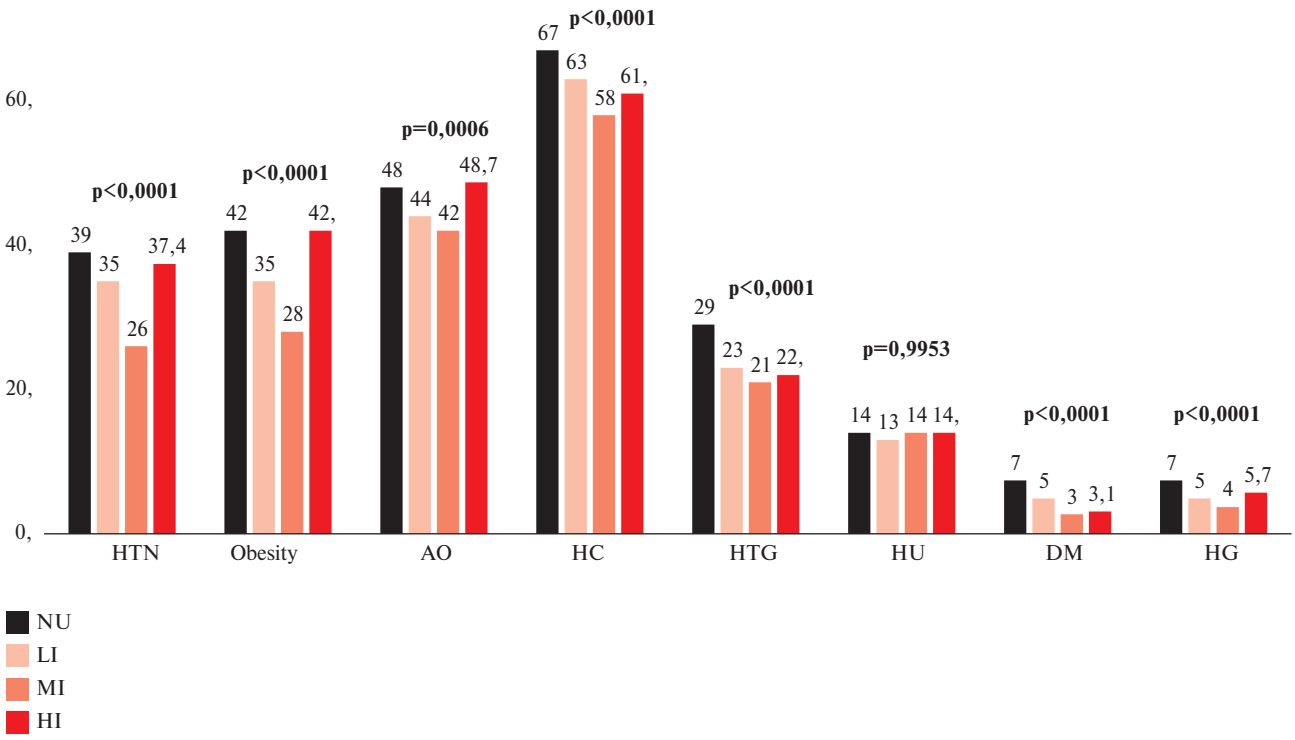

Figure 2 Prevalence of DRFs among women with different alcohol consumption levels.
Note: HTN — hypertension, AO — abdominal obesity, HI — high intake, HG — hyperglycemia, HTG — hypertriglyceridemia, HU — hyperuricemia, HC — hypercholesterolemia, LI — low intake, NU — do not use/do not us, no intake, DM — diabetes mellitus, MI — moderate intake.

0,24-0,83 (p=0,0117), respectively and cottage cheese (OR, 0,49; 95% CI: 0,38-0,63 (p<0,0001); OR, 0,47; 95% CI: 0,33-0,67 (p<0,0001), respectively). Rarer consumption of poultry is significant only for the MI group (OR, 0,8; 95% CI: 0,66-0,97 (p=0,0253)), raw vegetables and fruits — for the HI group (OR, 0,69; 95% CI: 0,55-0,86 (p=0,0011)) and sweets — for the LI group (OR, 0,85; 95% CI: 0,75-0,97 (p=0,0159)). Daily consumption of cereals, pasta, liquid dairy products (milk, kefir, yogurt), cheese and sour cream did not differ between the alcohol consumption groups in men. There were no significant differences between the groups in daily consumption of pickles and marinades, however, assessment of their total weekly and daily consumption made it apparent. Thus, the frequent consumption of pickles in individuals with MI and HI is higher compared with NI individuals (OR, 1,23; 95% CI: 1,04-1,45 (p=0,015); OR, 1,39; 95% CI: 1,12-1,73 (p=0,0027), respectively). This was reflected in the integral assessment of excess salt intake, which was higher in the MI and HI groups (OR, 1,4; 95% CI: 1,17-1,67 (p=0,0002); OR, 1,6; 95% CI: 1,26-2,04 (p<0,0001), respectively). Alcohol drinkers consume high-fat dairy products, as opposed to NI individuals who prefer low-fat products. Compared to NI persons, the excess consumption of milk fat is higher in LI (OR, 1,89; 95% CI: 1,32-2,7 (p=0,0005)) and HI (OR, 3,69; 95% CI: 1,43-9,49 (p=0,0068)) men.

There are more differences in diets among women. Compared to NI females, those of the LI, MI and HI groups significantly more often consume processed meat (OR, 1,16; 95% CI: 1,04-1,3 (p=0,0081); OR, 1,28; 95% CI: 1,04-1,58 (p=0,0215); OR, 1,85; 95% CI: 1,37-2,51 (p<0,000), respectively), animal protein (OR, 1,17; 95% CI: 1,07-1,27 (p=0,0004); OR, 1,32; 95% CI: 1,1-1,57 (p=0,0022); OR, 1,33; 95% CI: 1,01-1,77 (p=0,0454), respectively), add salt to cooked foods (OR, 1,23; 95% CI: 1,12-1,34 (p<0,0001); OR, 1,37; 95% CI: 1,15-1,64 (p=0,0004); OR, 1,98; 95% CI: 1,5-2,61 (p<0,000), respectively), and use animal fats in cooking (OR, 1,46; 95% CI: 1,33-1,61 (p<0,0001); OR, 1,3; 95% CI: 1,07-1,58 (p=0,0086); OR, 1,47; 95% CI: 1,07-2,04 (p=0,0192), respectively). Women in the LI and MI category more often consume red meat (OR, 1,15; 95% CI: 1,05-1,26 (p=0,0019); OR, 1,33; 95% CI: 1,11-1, 58 (p=0,0017), respectively), confectionery (OR, 1,29; 95% CI: 1,18-1,41 (p<0,0001); OR, 1,24; 95% CI: 1,04-1,47 (p=0,0164), respectively) and less often cereals/pasta (OR, 0,91; 95% CI: 0,84-1,0 (p=0,0415); OR, 0,82; 95% CI: 0,69-0,98 (p=0,0313), respectively), legumes (OR, 0,56; 95% CI: 0,29-0,75 (p<0,0001); OR, 0,47; 95% CI: 0,29-0,75 (p=0,0014), respectively), as well as cottage cheese (OR, 0,81; 95% CI: 0,73-0,9 (p<0,0001); OR, 0,56; 95% CI: 0,44-0,71 (p<0,0001), respectively). In addition, excessive consumption of added sugar is more often recorded (OR, 1,3; 95% CI: 1,19-1,41

Table 4

Mean levels of dietary factors in men and women depending on alcohol consumption

	NI				LI			MI			HI			p* for trend	p** for trend
	N	n	M	95% CI	n	M	95% CI	n	M	95% CI	n	M	95% CI		
Men															
SBP	7306	1201	134,5	133,4-135,5	4509	135,8	135,2-136,3	1118	136,2	135,2-137,2	478	138,6	136,9-140,3	0,0001	<0,0001
DBP	7306	1201	82,5	81,9-83,2	4509	83,6	83,3-83,97	1118	85,2	84,5-85,9	478	86,6	85,5-87,6	<0,0001	<0,0001
BMI	7306	1201	27,5	27,3-27,8	4509	27,5	27,4-27,7	1118	28,2	27,8-28,5	478	28,5	27,98-28,96	<0,0001	<0,0001
WC	7290	1199	92,4	91,6-93,5	4498	92,4	91,99-92,8	1117	94,3	93,5-95,1	476	96,1	94,8-97,4	<0,0001	<0,0001
TC	7306	1201	5,2	5,1-5,2	4509	5,3	5,3-5,3	1118	5,4	5,3-5,5	478	5,4	5,3-5,5	<0,0001	<0,0001
TG	7306	1201	1,5	1,5-1,6	4509	1,6	1,5-1,6	1118	1,7	1,6-1,8	478	1,7	1,6-1,8	0,0002	0,0002
UA	6593	1096	345,9	340,6-351,2	4108	353,1	350,3-355,9	955	363,3	357,6-369,1	434	368,0	359,2-376,7	<0,0001	<0,0001
HDL	7306	1201	1,2	1,2-1,3	4509	1,3	1,3-1,30	1118	1,3	1,3-1,4	478	1,4	1,3-1,4	<0,0001	<0,0001
LDL	7306	1201	3,3	3,3-3,4	4509	3,4	3,3-3,4	1118	3,4	3,4-3,5	478	3,4	3,3-3,5	0,0788	0,0118
Glucose	7305	1201	5,5	5,4-5,6	4508	5,4	5,4-5,5	1118	5,4	5,3-5,4	478	5,5	5,3-5,6	0,2957	0,221
Women															
SBP	12131	2954	133,5	132,7-134,3	8282	131,1	130,6-131,5	668	127,3	125,9-128,8	227	131,0	128,4-133,7	<0,0001	<0,0001
DBP	12131	2954	81,2	80,8-81,6	8282	81,0	80,8-81,2	668	79,8	78,98-80,6	227	82,7	81,1-84,3	0,0022	0,0512
BMI	12131	2954	29,2	28,98-29,5	8282	28,2	28,1-28,3	668	27,6	27,1-28,1	227	28,8	27,97-29,6	<0,0001	<0,0001
WC	12102	2953	87,5	86,97-88,1	8256	86,1	85,7-86,3	667	85,4	84,2-86,6	226	88,6	86,6-90,6	<0,0001	<0,0001
TC	12131	2954	5,6	5,5-5,6	8282	5,5	5,4-5,5	668	5,3	5,2-5,4	227	5,4	5,2-5,6	<0,0001	<0,0001
TG	12131	2954	15,5	1,46-1,53	8282	1,5	1,2-1,7	668	1,3	1,2-1,4	227	1,4	1,2-1,5	<0,0001	<0,0001
UA	11336	2815	276,4	273,3-279,5	7662	276,8	275,1-278,6	637	281,7	274,9-288,4	222	288,6	277,6-299,6	0,1044	0,0958
HDL	12131	2954	1,4	1,4-1,4	8282	1,5	1,5-1,5	668	1,5	1,5-1,6	227	1,5	1,5-1,6	<0,0001	<0,0001
LDL	12131	2954	3,5	3,48-3,56	8282	3,4	3,4-3,4	668	3,2	3,1-3,3	227	3,2	3,1-3,4	<0,0001	<0,0001
Glucose	12125	2952	5,4	5,3-5,4	8278	5,2	5,18-5,24	668	5,2	5,1-5,3	227	5,23	5,1-5,5	0,3898	0,5058

Note: Note: * — Cochran-Armitage test; ** — Jonckheere's trend test. LI — low intake, CI — confidence interval, MI — moderate intake, HI — high intake, DBP — diastolic blood pressure, CI — confidence interval, BMI — body mass index, HDL — high density lipoproteins, LDL — low density lipoproteins, UA — uric acid, WC — waist circumference, TC — total cholesterol, SBP — systolic blood pressure, TG — triglycerides.

(p<0,0001); OR, 1,25; 95% CI: 1,05-1,48 (p=0,0125), respectively). Women of the LI category more often daily consume milk, kefir and yogurt (OR, 1,26; 95% CI: 1,15-1,47 (p<0,0001)) and less often — fish products (OR, 0,82; 95% CI: 0,71-0,94 (p=0,0049)). MI women significantly less often intake high-fat dairy products daily, such as sour cream and cream (OR, 0,75; 95% CI: 0,6-0,94 (p=0,0143)), and those from the HI group less often consume fruits and vegetables (OR, 0,68; 95% CI: 0,51-0,9 (p=0,0067)). Consumption of poultry, pickles and cheese did not significantly differ between the categories of alcohol consumption among women. According to the integral assessment, in the LI, MI and HI categories, compared with NI women, excessive salt consumption (OR, 1,18; 95% CI: 1,08-1,29 (p=0,0002); OR, 1,36; 95% CI: 1,14-1,62 (p=0,0008); OR, 2,08; 95% CI: 1,54-2,82 (p<0,0001), respectively), excess milk fat intake (OR, 1,63; 95% CI: 1,34-2,0 (p<0,0001); OR, 1,72; 95% CI: 1,11-2,68 (p=0,0149); OR, 2,12, 95% CI: 1,01-4,45 (p=0,047), respectively), excess salt and added sugar intake (OR, 1,38; 95% CI: 1,24-1,53 (p<0,0001); OR, 1,41; 95% CI: 1,15-1,73 (p=0,0008); OR, 1,73; 95% CI: 1,27-2,34 (p=0,0004), respectively) are more often present. Healthy eating habits are less common in women from the LI and MI categories (OR, 0,64; 95% CI: 0,5-0,82 (p=0,0004); OR, 0,5; 95% CI: 0,28-0,92 (p=0,0245), respectively).

The pronounced differences in diets in different alcohol consumption categories indicate a significant increase in the share of high-energy products, which should obviously be manifested in differences in the frequency of dietary risk factors (DRFs) for CVD in above alcohol-consuming categories. Figures 1, 2 and Table 4 show the frequency and average levels of DRFs for CVD in alcohol consumption categories, respectively. The mean values of systolic and diastolic blood pressure, body mass index, waist circumference, total cholesterol, triglycerides, uric acid-, high- and low-density lipoprotein cholesterol in men increase with rising alcohol consumption, forming significant upward trends. The exception is blood glucose values, the differences in which in the alcohol consumption categories are not significant. Along with an increase in alcohol consumption, a growth in the prevalence of hypertension, obesity/overweight, hypercholesterolemia, hypertriglyceridemia and hyperuricemia is observed, which also forms significant upward trends. The incidence of diabetes and hyperglycemia is characterized by downward trends. In general, absolutely all DRFs in men showed significant differences between the alcohol consumption categories.

The situation is different among women, where in contrast to men, hypertension, obesity, abdominal obesity, hypercholesterolemia and hypertriglyceridemia have not a linear upward trend, but, on the contrary, a downward and U-shaped one. The RF rates in the NI and HI categories are very similar, and in terms of obesity and abdominal obesity, they are almost identical. For hyperuricemia, the significance of the trend has not been confirmed. The trends in diabetes and hyperglycemia in men are decreasing. A similar trend in women is also determined by the average values, where U-shaped trend forms and the comparability of NI and HI values remain.

Discussion

The results of this study demonstrated the relationship between the alcohol consumption level and dietary pattern. An analysis of dietary habits showed that in both men and women, an increase in alcohol consumption was associated with a higher intake of red and processed meat and a decrease in consumption of plant-based products. Alcohol drinkers are more likely to add salt to cooked food and prefer high-fat dairy foods. There is a pronounced imbalance in the eating habits of alcohol drinkers (high salt intake, animal fats; in women, consuming too much sugar). The higher the level of alcohol consumption, the more pronounced these disorders are. Similar associations with dietary disorders and a pronounced imbalance are noted in almost all studies [3-5, 7], and some also indicate macro- and micronutrient deficiency in alcohol consumers [4, 5, 7, 16].

In men, the alcohol consumption level is associated not only with a higher energy diet, but also with an upward trend of CVD DRFs, in contrast to women, where the situation is the opposite. Results of this analysis are consistent with another Russian study conducted in the Kemerovo Oblast, where such dependence of alcohol consumption and DRFs are predominantly linear n men, while in women, a U-shaped or J-shaped associations are noted [17]. Perhaps this is due to the lower alcohol consumption level among women, which is shown in this study. In addition, women prefer less strong drinks, such as wine, and, perhaps, therefore, the damaging contribution of alcohol is manifested in women to a lesser extent. Another possible reason is a higher attention of women to their RFs, whom, by changing the dietary pattern, more easily refuse or reduce the level of alcohol consumption. It should be noted that the association we found between the level of alcohol consumption and body weight in women was also noted in foreign studies with the only difference that the level of ethanol consumption among women is many times higher than the amount noted in this analysis [16].

Conclusion

This analysis has clearly demonstrated that alcoholic drinkers have high-energy diets with higher levels of saturated fat, added sugars and salt due to higher consumption of red meat, especially processed, high-fat dairy products, and women — also confectionery. In view of this, the idea that the negative

effect of alcohol consumption on the body is enhanced by the unhealthy eating habits seems justified, but at the same time there are reasonable doubts on the protective role of low-dose alcohol, since the growing imbalance in the diet is already observed in the LI persons compared to NI. Doubts are growing when analyzing DRFs in the alcohol consumption categories, especially in men, among whom the prevalence of DRFs increases linearly, while among women it begins to decrease. Perhaps the sex differences observed in this analysis are associated with initial differences in the eating habits of Russians [17, 18]. All this as a whole opens up a scientific discussion more than provides answers, since this work did not assess prognostic contribution of these factors due to cross-sectional design of the ESSE-RF. It seems advisable to continue the study of associations between eating habits and type of alcohol consumed, as well as the assessment of its contribution to prognosis.

Relationships and Activities: none.

References

1. Griswold MG, Fullman N, Hawley C, et al. Alcohol use and burden for 195 countries and territories, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2018;392(10152):1015-35. doi:10.1016/S0140-6736(18)31310-2.
2. Burton R, Sheron N. No level of alcohol consumption improves health. Lancet. 2018;392(10152):987-8. doi:10.1016/S0140-6736(18)31571-X.
3. Gherasim A, Arhire IL, Niță O, et al. The relationship between lifestyle components and dietary patterns. Proc Nutr Soc. 2020;79(3):311-23. doi:10.1017/S0029665120006898.
4. Kesse E, Clavel-Chapelon F, Slimani N, et al. Do eating habits differ according to alcohol consumption? Results of a study of the French cohort of the European Prospective Investigation into Cancer and Nutrition (E3N-EPIC). Am J Clin Nutr. 2001;74(3):322-7. doi:10.1093/ajcn/74.3.322.
5. Fawehinmi TO, Ilomäki J, Voutilainen S, et al. Alcohol Consumption and Dietary Patterns: The FinDrink Study. PLoS One. 2012;7(6):e38607. doi:10.1371/journal.pone.0038607.
6. Barefoot JC, Gronbaek M, Feaganes JR, et al. Alcoholic beverage preference, diet, and health habits in the UNC Alumni Heart Study. Am J Clin Nutr. 2002;76(2):466-72. doi:10.1093/ajcn/76.2.466.
7. Breslow RA, Guenther PM, Smothers BA. Alcohol drinking patterns and diet quality: the 1999-2000 National Health and Nutrition Examination Survey. Am J Epidemiol. 2006;163(4):359-66. doi:10.1093/aje/kwj050.
8. Sluik D, Lee L, Geelen A, et al. Alcoholic beverage preference and diet in a representative Dutch population: the Dutch national food consumption survey 2007-2010. Eur J Clin Nutr. 2014;68(3):287-94. doi:10.1038/ejcn.2013.279.
9. Alcácera MA, Marques-Lopes I, Fajó-Pascual M, et al. Alcoholic beverage preference and dietary pattern in Spanish university graduates: the SUN cohort study. Eur J Clin Nutr. 2007;62(10):1178-86. doi:10.1038/sj.ejcn.1602833.
10. Sluik D, Bezemer R, Sierksma A, et al. Alcoholic Beverage Preference and Dietary Habits: A Systematic Literature Review. Crit Rev Food Sci Nutr. 2016;56(14):2370-82. doi:10.1080/10408398.2013.841118.
11. Sieri S, Agudo A, Kesse E, et al. Patterns of alcohol consumption in 10 European countries participating in the European Prospective Investigation into Cancer and Nutrition (EPIC) Project. Public Health Nutr. 2002;5(6B):1287-96. doi:10.1079/PHN2002405.
12. Sieri S, Krogh V, Saieva C, et al. Alcohol consumption patterns, diet and body weight in 10 European countries. Eur J Clin Nutr. 2009;63 Suppl 4:S81-100. doi:10.1038/ejcn.2009.76.
13. Scientific Organizing Committee of the ESSE-RF, Epidemiology of cardiovascular diseases in different regions of Russia (ESSE-RF). The rationale for and design of the study. Profilakticheskaya Meditsina. 2013;6:25-34. (In Russ.)
14. Technical regulations of the Customs Union "Food products in terms of labeling" (TR 022/2011). (In Russ.)
15. Official website of the World Health Organization. Healthy diet. Fact sheets. WHO, 29 April 2020. http://www.who.int/news-room/fact-sheets/detail/healthy-diet (18.02.2021).
16. Liangpunsakul S. Relationship between alcohol intake and dietary pattern: Findings from NHANES III. World J Gastroenterol. 2010;16(32):4055-60. doi:10.3748/wjg.v16.i32.4055.
17. Maksimov SA, Tsygankova DP, Artamonova GV. Frequency of cardiovascular risk factors in relation to the volumes of alcohol consumption (the ESSE-RF study in the Kemerovo Region). Profilakticheskaya Meditsina. 2017;20(6):91. (In Russ.) doi:10.17116/profmed201720691-96.
18. Karamnova NS, Shalnova SA, Tarasov VI, et al. Gender differences in the nutritional pattern of the adult population of the Russian Federation. The results of ESSE-RF epidemiological study. Russ J Cardiol. 2019;24(6):66-72. (In Russ.) doi:10.15829/1560-4071-2019-6-66-72.