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Review Article



# Leading Risk Factors for Cardiovascular Disease Among the Population of The North-West of Russia

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**Abstract**

Arterial hypertension and coronary heart disease cause huge damage to the health of the population, being the strongest risk factor for the excess mortality of the population. The results of many prospective studies conducted in the country show a high prevalence of these FR and prove their influence on the indices and dynamics of CVD mortality [1,2]. The concept of RF became the scientific basis for prevention, reducing morbidity and mortality from CVD and is widely used in practical work [3-5].

**Keywords:** Risk factors; Cardiovascular diseases; The population of the North-west of Russia

## Introduction

The study of regional features of the RF in the conditions of over-mortality of the population is actual, which determined the subject of this study. One of the important achievements in the field of cardiology in the second half of the 20th century was the discovery of factors affecting the development and progression of CVD, which received the name of risk factors (RF). At the same time, it is necessary to take measures aimed at changing the way of life and correction of other risk factors or diseases. The analysis, based on non-fitting criterion, proves possible impact of such risk factors as obesity, smoking, alcohol abuse (these risk factors are seen more often among younger population), marital status (especially widowers and widows), job dissatisfaction and stress, on the development of cardiovascular diseases in the population. However, high level of educational qualifications in the population allows having special courses for hyper-tensive individuals where technological intervention acts as a basic method of primary prevention of hypertension and its complications [6,7].

## Methods

In the period 2012-2014, one-moment, two-stage (cardiologic and psychometric screening), a selective, epidemiological study (cross-sectional study) was conducted to detect arterial hypertension (AH) and its risk factors (RF) among adults [1,8,9]. Based on 1% of the sample, 4578 respondents (2606 men and 1972 women) were selected. As a survey, the standard questionnaire of the GNITS PM was used. Population sampling was formed on the basis of name-based voter lists using a random number method in a computer variant in a non-recurring way with a response rate of 73.1% (male) and 76.0% (female). The method of selecting respondents was based on the settlement-nuclear type of the stratified sample. The age composition of the population, taking into account gender differences, was divided into 6 decades corresponding to the European age classification.

In the process of mathematical analysis of the data obtained, we applied the methods of descriptive statistics; dispersive one- and multifactor analyzes; correlation-regression analysis based on the matrix method and multiple analysis with a selection in this case of the regression equation model and an evaluation of the results obtained on the basis of the Gaussian distribution; multidimensional statistical methods, including cluster and factor analysis. Statistical pro-cessing of data was carried out using the program STATISTICA 10, Stat Soft. License number AGAR207F394525FA-6.

## Results

An analysis of the mortality of the population showed that 62% of the region's population dies from cardiovascular pathology. The comparative analysis taking into account the sex of risk factors (FF) revealed a number of statistically significant differences. Thus, among all FF, statistically significant differences were revealed by the factor of diet compliance at t = 7.27 (P <0.0001) and t = -2.82 (P <0.0156) when assessing non-compliance with the diet. The value of the inter-quartile range (QR) according to non-parametric statistics was when assessing compliance with the diet Me 28.8 (at 26.3 ÷ 30.8) and Me 70.7 (at 60.7 ÷ 71.3) with assessment of non-compliance with the diet. It was found that compliance with the diet is more typical for women within 30%. At the same time, the diet is not respected regardless of sex in the range of 60-70% of respondents. This fact was subsequently reflected in the frequency of dyslipidemia among the population [10-12].

Parametric analysis revealed significant differences in the frequency of tobacco smoking, taking into account gender differences. Thus, 62.4% of respondents never smoked at t = 4.91 (P <0.0004). Nonparametric analysis showed that 59% of respondents never smoked with a QR value of 52.6 ÷ 69.8. At the same time, the maximum values for this indicator were more than 80%. The high Gaussian density is 17.1 [13-15].

When assessing the use of vodka in the amount of 50-100 ml. the significance of the differences was at t = -3.56 (P <0.004). Nonparametric analysis showed that 12% of the population consumed the mentioned quantity of vodka at the value of QR 7.4 ÷ 12.9 and the Gaussian density was only 5.5.

The highest significance of gender differences was noted in assessing motivation for work (the desire to work). In this case, 13.3% of women note a lack of motivation and a moderate motivation of 34.5% (respectively, M 13.3 for SD 4.3 ± 3.7 and M 34.5 for SD 15.0 ± 12.1). Among men this indicator is equal to M 12.4, respectively, with SD 2.9 ± 1.9 and M 31.5 with SD 15.2 ± 13.2. Non-parametric data of lack of motivation accounted for the median value among women 11.1, respectively, with QR 9.3 ÷ 16.9; among men, Me 12.7 with a QR value of 11.5 ÷ 15.0 and a Gaussian density of 3.5. In the second parameter, the evaluation of non-parametric data showed that there is a moderate median motivation for women among 31.7, respectively, with a QR value of 18.6 ÷ 51.4, with a Gaussian density of 32.8; among men, Me 33.7 with a QR value of 14.6 ÷ 47.4 and a Gaussian density of 32.7 [16-18]. Thus, it was found that the lack of motivation for work in men is more manifested than in women.

In assessing moderate dissatisfaction with family relationships, a gender difference was found at t = 2.64 (P <0.0217). Among women, M 24.6% with SD 4.5 ± 3.3; among men, M 18.4% with SD 4.1 ± 3.1. Nonparametric analysis showed that non-satisfaction with family relationships among women Me 25.0% with QR 20.9 ÷ 26.6 and a Gaussian density of 5.7; respectively among men Me 19.5% with QR 14.4 ÷ 20.3 and Gaussian density equal to 6.3.

Thus, a higher level of moderate dissatisfaction in the family in women was revealed. For the rest of the indicators, statistically significant gender differences are absent. The frequency of prevalence of AH 1 degree among men is 30%; 2 degrees - 27% and 3 degrees 13%. Among women, respectively, 27.28 and 13%. The highest prevalence of hypertension does not depend on the age and sex of the respondents and are in the 95% range of the interval. Attention is drawn to the high proportion of the frequency of hypertension in the younger age groups irrespective of sex and reaching almost 50% in the age group of 80 years and older. In older age groups AH 2 and 3 degrees is dominant. The proportion of AHs 2 and 3 in the older age group is slightly higher among women [19,20].

The highest significance of differences taking into account gender characteristics with-out taking into account the degree of hypertension is presented in the age group of 70-79 years (t =-3.63 at P=0.0109) and in the age group 80 years and older (t=-3.10 P=0.0211).

Thus, for the population the most common degree of AH is 1 and 2 degrees. At the same time, the second and third degree has gender characteristics and they are characteristic for middle and older age groups irrespective of sex. The degree of AH in women is shifted to the 1 age group in the direction of AH weighting [21].

The population of the Novgorod region is characterized by the presence of obesity regardless of gender, with an emphasis on the average age groups. The number of patients is com-parable with the number of patients in the Northwest of Russia.

The non-parametric analysis carried out on the basis of the Friedman criterion and Kendall concordance showed that the family status of the respondents is gendered. Thus, the magnitude of the interquartile range in terms of the state of the marriage among the men has higher values for 75 quartiles. At the same time, the median environment of QR gravitates toward the upper boundary. Taking into account the value of the Gaussian density, it can be seen that men often live separately, although the minimum value for individual men can be zero.

Thus, the number of men who do not work by age exceeds that of women. In men, the value of QR is significantly higher than in women of 75 quartiles. Introduction to the age gradient analysis showed that half of the respondents in the age groups 40-49 and 70-79 years, as well as 80 years and older, do not work due to illness. In the 60-69 age group, women have a high proportion of the unemployed due to illness. Thus, it can be seen that men cannot continue to work after reaching retirement age, which subsequently affects the social status of respondents.

The descriptive analysis showed that 62% of women (SD 11.2 ± 8.2) and 33.2% of men (SD 11.2 ± 8.6 at P = 0.7747) never smoked. Nonparametric data indicate that 59% of women have never smoked (QR 52.6÷69.8) and 31.1% of men (QR 26.3÷43.9). 14.1% of women (SD 8.5 ± 6.3) and 25.8% of men (SD 13.4 ± 10.7 with P = 0.0756) have now quit smoking. Non-parametric data indicate that 15.1% of women (QR 6.6÷17.8) and 24.2% of men (QR 9.8÷37.9) have quit or do not smoke now. 25.6% of women (SD 7.7 ± 28.8) and 36.8% of men (SD 19.9 ± 16.8 P = 0.7747) smoke now. The number of cigarettes per day is statistically homogeneous and is up to 10 cigarettes per day regardless of gender.

Cluster analysis showed that women in the age group 20-29, 30-39, 40-49 years and after 70 years have never smoked; men differ in age peculiarities with a frequency different in each age group. All women age groups until 70 years smoke now; men – only in senior age groups.

Smoking cessation is not a dominant feature in any age group, regardless of gender. The rate of cigarette use in the female population is slightly higher, especially in the younger age groups. Thus, the analysis indicates the dominance of this harmful habit in female subpopulation with a sharp rejuvenation of the habit [22,23].

Conducted descriptive analysis has shown that 44.3% of women (SD 9.6 ± 7.3) and 34.8% of men (SD 18.2± 14.6 P = 0.2423) have been drinking no alcohol. Nonparametric data indicate that 45.9% of women (QR 36.5÷51.9) and 25.4% of men (QR 23.9÷52.4) have been drinking no alcohol. 2.6% and 4.3% of women (SD 2.4 ± 2.2 and SD 4.2 ± 3.0); 1.7% and 7.9% of men (SD 1.6 ± 1.4 and SD 3.9 ± 3.1 when P = 0.4070 and when P = 0.1268) intake respectively excessive alcohol (daily or more 100 ml. of vodka).

Nonparametric data indicate that 6.4% of women intake excessive alcohol on the maximal values of QR in more than 100 ml of vodka within 12.8%; men – 3.7% of more than 100 ml. of vodka in the range of 12.4%. Distribution according to age groups shows that daily consumption of alcohol is true for the age groups of 50-59, 30-39, and 40-49 years for men and 70-79 years for women with the amount of alcohol over 100 ml. of vodka for men of older age groups and women in the age groups 50-59 and 60-69 years.

Thus, there is feminization of the harmful habit characteristic of the middle female age groups and male older age groups. The noted fact correlates with the index of the widow among the population at Spirmen correlation coefficient = 0.79.

When considering the index of physical activity (PA), it was found that limited physical activity is characteristic for 28-29%, moderate – for 62-67% and significant for 20-23% of respondents.

The significance of gender-specific differences, excluding the severity of physical activity, is noted in the age group of 80 years and older (t=-3.95 at P= 0.0168) for minimum indicators and t=-4.42 at p= 0.0115 for maximum indicators. The conducted descriptive analysis showed that limited physical activity was 24.6% among women (SD 15.6 ± 12.9) and 22.8% among men (SD 19.9± 15.7 at P = 0.8439). Significant physical activity was 21.5% among women (SD 18.2 ± 13.8) and 16.1% among men (SD 13.0± 10.1 at P = 0.5393).

Nonparametric data indicate that 24.1% of women have limited PA (QR 10.4÷38.2) and 16.7% of men (QR 9.0÷42.0). Significant PA is characteristic for 17.5% of women (QR 7.1÷31.7) and 16.2% of men (QR 2.8÷30.9). Limited PA is typical for women in the age group of 60-69, 70-79 years, for men in the age group of 50-59 and 60-69 years. A significant PA is characteristic of 60-69 years and older among women and 50-59, 60-69, 70-79 years among men.

Thus, limited PA is characteristic of older age groups regardless of gender, significant PA – for middle and younger age groups.

The conducted descriptive analysis showed that 40.2% of women (SD 2.8 ± 2.2) and 28.9% of men (SD 3.0± 2.2 at P = 0.0001) were on diet. 55.0% of women (SD 3.4 ± 2.9) and 65.4% of men (SD 9.2± 6.7 with P = 0.0156) do not follow the diet.

Nonparametric analysis revealed that 41.0% of women with value QR 37.0÷41.5 and 28.8% of men with the value of QR 26.3÷30.8 do not follow the diet. 53.8% of women with the value QR 51.4÷58.1 and 70.7% of men with the value of QR 60.7÷71.3 do not follow the diet. The maximum values were 59.9% for women and 71.8% for men.

Thus, non-compliance with the diet is a dominant risk factor for respondents regardless of gender, with the prevalence of male subpopulation. The conducted descriptive analysis showed that 6.2% of women (SD 3.1 ± 2.2) and 4.3% of men (SD 2.3± 1.9 at P = 0.2103) experienced daily stress. Nonparametric analysis has shown that 5.8% of women at the value QR 4.0÷8.4; 4.7% of men at the value of QR 2.0÷5.9 experienced daily stress. The maximum values in women were 11.6%, in men 8.2%.

The prevalence of anxiety and depression among the population has clearly expressed gender character and is correlated with the prevalence level of hypertension among the population. We do not exclude the combination of arterial hypertension and anxiety-depression syndrome as a single syndrome complex. The noted should determine the possibility of AH treating with beta-blockers, as drugs that can cause depression in patients, thereby weighting the course of AH disease.

The importance of differences taking into account gender features and without taking into account the severity of emotional stress is noted in the age group of 80 years and older (t= -2.44 at P= 0.0407) for maximum performance. No differences were found in other parameters.

## Discussion and Conclusion

To assess the possibility of falling ill with AG respondents, we used the criterion of dis-agreement (OR). As our study showed the calculations of the disagreement criterion showed that the chances of women getting AH are the highest in the age group of 50-59 years (OR 22.16 at P=0.05 and QR 8.87÷55.41). Among men, this criterion is slightly lower, and it is the highest in the age group of 60-69 years (OR 11.67 at P = 0.05 and QR 2.9÷46.96). In other age groups, the criterion of disagreement has no statistically significant gender differences.

Thus, it is proved that the chances to get AH are higher among women. Men's chances are 1.9 times lower than women's and more susceptible with the older age group. Obviously, such a phenomenon is associated with the previously recorded phenomenon of super-mortality among men in the age group of 50-59 years.

Calculations of the disagreement criterion showed that the chances to get AH for women with excessive BMI are the highest in the age group of 40-49 years (OR 1.97 with P=0.05). In assessing obesity, OR values are increased to 3.68 at P=0.05. Among men, this criterion is slightly higher and it is the highest in the age group of 60-69 years (OR 2.58 at P=0.05). In assessing obesity, OR values

are increased to 3.2 in the 60-69 age group and to 3.27 in the 30-39 age group with P=0.05. In other age groups, the criterion of disagreement has no statistically significant gender differences. Attention is drawn to the exceedance of the indicator regardless of age group among men both in BMI and in obesity. Assessing the chances of AH development in abdominal obesity, it was found that this type of obesity is gender-independent for the age group of 60-69 years - in women 2.48; in men – 2.32 at P=0.05. In general, for men and women, OR values for this type of obesity are 1.82 and 1.91, respectively.

Thus, it is shown that abdominal obesity increases the chances of AH in the population within 2 times. Assessing the impact of family status on the risk of AH in the population it was found that marital status has an impact on the possibility of development of AH in the population. It is shown that in almost every age group, the chances of falling ill with AH among married women range from 1.7 to 6.33; among married men – in all age groups, with the exception of the age group 30-39 and 50-59 years. In general, the odds ratio for married men and women is within 3.2 at p=0.05 and QR 2.07÷4.95 and 3.52 at p=0.05 and QR 2.27÷5.46 respectively. The chances are higher in married men in the age group of 60-69 years (OR 3.14 at p=0.05 and QR 0.4÷24.42) and among women in the age group of 70 years and older (OR 6.33 at p=0.05 and QR 0.63÷63.64). In assessing the status of divorced, the value of OR is significantly higher than that of women in comparison with men (respectively, OR 4.62 at p=0.05 and QR 2.65÷8.03 and 0.85 at p=0.05 and QR 0.44÷1.62).

Significant changes were observed in all age groups in the evaluation of widowhood status. Thus, among men, the values of the odds ratio are 7.47 at p=0.05 and QR 3.57÷15.6; among women – 24.86 at p=0.05 and QR 13.91÷44.43.

Thus, it is established that marital status has a direct significant impact on the incidence of AH in population.

When evaluating the odds ratios of the influence of smoking on the ability of the AH disease it is established that the frequency of smoking is significant only in the age group of 20-29 years for males (OR 2.97 at P=0.05) and in the age group of 30-39 years in women (OR 3.72 at P=0.05).

When evaluating the odds ratios of the effect of alcohol consumption on the ability of AH disease it is established that a significant impact of alcohol consumption on the ability of AH developing does not exist [24-26].

Low physical activity affects the development of AH only in women in the age group of 20-29 years (OR 2.87 at P=0.05), 40-49 years (OR 1.59 at p=0.05). In men, the test value is well below 1, indicating no influence. The data obtained indicate a significant increase in pathology among the population of the region compared with the data of the sample survey 2003-2004 [2,13,18,19,27].

The conducted analysis on the basis of the disagreement criterion proves the possible in-fluence on the development of cardiovascular disease among population such RF as obesity, smoking, alcohol consumption (in the background of the rejuvenation data of RF), marital status (especially the status of widowhood), dissatisfaction with work and stress [8,9,17,20,28]. However, the presence of a high level of educational qualification in the population allows to use actively "schools of hypertensive people" for technological intervention as a basic means of primary prevention of AH and its complications.

## Disclosures

All authors have not disclosed potential conflicts of interest regarding the content of this paper.

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