UDC: 616.831-005.4-036.11

RISK FACTORS FOR THE DEVELOPMENT OF BRAIN STROKE AMONG THE ADULT POPULATION

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The aim of the study was to determine the prevalence of the main groups of Risk Factors (RF) for the development of Brain Strokes (BS) among the adult population. 500 patients aged 19–91, who received rehabilitation measures on the basis of the clinical sanatorium "Roshcha" and "Bereziv Mineral Water Resort", were examined. Two groups were formed: the Main Group (MG), which included 300 patients, and the Control Group (CG), which included 200 patients. The average age of patients in MG was (56.66±9.90) years, in CG persons – (57.16±10.79) years. All patients signed the informed consent. The research was conducted by the questionnaire method. For this purpose, the author's questionnaire was used to establish RFs of BS development. When conducting a medical-statistical analysis of the calculations were carried out using non-parametric medical and statistical methods. The probability of differences was determined using the Mann-Whitney U-test. The threshold value of the level of probability of all calculated features was taken as 0.05 (p=0.05). When conducting research significant eating behavior disorders among MG persons were reliably determined, which were characterized by significant and excessive consumption of food and non-compliance with the diet. It is probable that a significant percentage of MG persons with the presence of stressful situations were noted, which were noted every day (20.0%) or 1–2 times a week (21.3%) or less often (36.3%). The presence of probable prevalence of deterioration of well-being due to changes in weather conditions among persons MG with probably significant drops in blood pressure. The presence of probable sleep problems was determined. Thus, the most significant RFs of BS development were determined, which were grouped into five groups: medical-biological uncontrolled, medical-biological controlled, medical-social, psychological and climatic with a daily regime.

Keywords: medico-biological risk factors, medico-social risk factors, psychological risk factors, climatic risk factors.

Introduction

Many global studies have confirmed the relevance of CardioVascular Disease (CVD) research. This group of diseases has a significant prevalence and high levels of negative medical and social consequences

(high levels of disability and mortality of the world population, significant levels of Disability-Adjusted Life Years (DALY) and Years Lived with Disability (YLD), etc.

Annually, CVD causes the death of more than 18 million persons [1]. These mortality rates are primarily caused by diseases of the circulatory system: coronary heart disease and Brain Strokes (BS) [2]. According to studies, the annual global mortality due to BS is about 6.7 million (11.9% of all global mortality) [3; 4].

Thus, the study of medico-epidemiological characteristics of CVD, diseases of the circulatory system, cerebrovascular diseases and, in particular, BS is an actual problem for world medicine. The relevance of the study of these diseases is determined by the significant prevalence of these diseases and high negative medical and social consequences (disability and mortality of the population, high levels of DALY and YLD, etc.) [5–7].

Thus, BS annually provokes 11.9% of all global deaths and ranks second in terms of mortality rates after coronary heart disease [3; 4]. BS is the leading cause of temporary and permanent disability [8]. MI occurs at the level of 100–300 cases per 100,000 world population (17 million cases). The annual European levels of prevalence of BS are 1.2 million cases [9] with a 2–3 times predominance among Eastern European countries compared to Western [10].

According to research, a new case of BS is registered every 2 seconds, and a death – every 6 seconds. More than 25.0% of disability in the world's adult population is caused by BS, each year increasing the number of persons with persistent consequences of cerebral catastrophes by 6 million [4]. About 30.0–40.0% of persons after BS die in the first month, about half – within a year; 20.0–40.0% of patients need external assistance (12.5% among all causes of primary disability of the population) and only 10.0% return to a full and active life after BS.

According to forecasts of World Health Organization (WHO) experts, the incidence of BS will increase due to the aging of the population and an increase in the prevalence of Risk Factors (RF) (various heart diseases, arterial hypertension, lipidemia and diabetes, hypercholesterolemia [11], hypodynamia, poor nutrition, chronic stress, alcohol abuse and smoking, etc.). According to WHO forecasts, the incidence of BS in European countries will increase by 34.0% and the mortality rate by 45.0% by 2035 [4].

In Ukraine, high levels of prevalence of BS are also registered, occupying one of the leading places among European countries [12]. Every year, more than 120,000 new cases of BS are diagnosed in our country, which is 1.5–2 times higher than the global incidence rate. Mortality due to BS in Ukraine is 2–3 times higher than the level of developed countries of the world. BS in Ukraine ranks second in terms of causes of mortality and disability of the population.

This situation with the prevalence and negative consequences of BS is determined by the significant spread of RF of BS development. FRs are divided into three large groups:
- unmodified (unchanged, characteristic of a specific person);
- modified (variable with the help of healthy lifestyle measures);
- potentially modified (conditionally variable).

Unmodified RFs include sex, age, race, and genetic factors. Before modifications – hypertension, diabetes, obesity, hypercholesterolemia, thyroid problems, improper eating habits, low physical activity, etc. Before potential modifications – metabolic syndrome, alcohol abuse, migraine, hyperhomocysteinemia, inflammation and infections, etc. [13–15].

The effect of a significant number of these RFs can be prevented by implementing primary prevention measures. This will make it possible to significantly reduce the prevalence of this disease and negative medical and social consequences (mortality, disability of the population, high levels of DALYs and YLDs).

To implement this, it is necessary to have information about the most common RFs of BS development both at the national level as a whole, and in each specific case individually for each person.

Therefore, conducting a medical and social study to determine the prevalence of RF in the development of BS at the national level is a very relevant problem for domestic and global medicine.

The aim of the study – to determine the prevalence of the main risk factors of brain strokes development among the adult population.

Materials and Methods

500 patients aged 19–91, who received rehabilitation measures on the basis of the clinical sanatorium "Roshcha" and the clinical sanatorium "Berezivski mineral waters resort", were examined. Two groups were formed: the Main Group (MG), which include 300 persons suffered from BS, and the Control Group (CG), which include 200 persons without CVD in anamnesis. In MG, the average age of patients was (56.66±9.90) years. Most of them (67.7%) were male and belonged (58.3%) to the age group over 65 years. The average age among CG persons was (57.16±10.79) years. There was a general predominance of women (45.0%) and persons (57.5%) over 56 years of age.

The study and analysis of the objects of our research was carried out by copying the data of accounting medical documentation (control card of dispensary observation (form 030/o); medical card of an inpatient patient (form 003/o)) and survey. The survey was conducted according to the author's standardized questionnaire ("Questionnaire for establishing and assessing the RFs of stroke"). The questionnaire contains general questions about age, gender, place of residence and others. Also included are 90 questions, which were divided into five groups of risk factors: medico-biological (controllable and uncontrollable), medico-social, psychological and climatic (with an agenda). The research was conducted in accordance with existing bioethical norms and rules. All persons participated in the study of their own free will with a personal signature in the informed consent.

When conducting a medical-statistical analysis of the distribution of qualitative and quantitative signs, it was established that there were significant differences from the normal nature of the distribution. Further calculations were carried out using non-parametric medical and statistical methods.

The probability of differences was determined using the Mann-Whitney U-test. The threshold value of the level of probability of all calculated features was taken as 0.05 (p=0.05). Statistical calculations were performed in IBM SPSS 25.0 for Windows.

Results and Discussion

First of all, we identified a group of medico-biological uncontrolled RF. In this group, probable results of a possible influence on the development of BS were obtained in relation to the sex of the examinees and burdened anamnesis of BS. Also, the improbable results of the possible influence of the presence of other diseases on the development of BS were determined (*Table 1*).

A probable (χ^2=8.050, *p*=0.005) advantage was determined among women with MG compared to men (respectively, 166 (55.3%) and 134 (44.7%) persons) and the presence of a heavy anamnesis of stroke pathology (respectively, 207 (69.0%)

and 93 (31.0%) persons (χ^2=17.711, $p<$ <0.001)). Also, the presence of concomitant pathology in all 100.0% of MG persons has a possible influence on the development of BS (χ^2=1.503, p=0.220) (results are presented in *Table 1*).

To the medico-biologically managed RFs of the development of BS among the adult population, we included the presence of excess weight, blood pressure (BP), attitude to food (excessive consumption) and diet (following it) (*Table 2*).

Table 1. Medico-biological uncontrollable RFs for the development of BS among MG individuals compared to CG (abs, %)

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
sex				
male	64 (32.0)	134 (44.7)	8.050	0.005
female	136 (68.0)	166 (55.3)		
accompanying pathology				
absent	1 (0.5)	–	1.503	0.220
available	199 (99.5)	300 (100.0)		
anamnesis aggravated by strokes				
missing	29 (14.5)	93 (31.0)	17.711	<0.001
available	171 (85.5)	207 (69.0)		

Table 2. Medico-biological uncontrollable RF for the development of BS among MG individuals compared to CG (abs, %)

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
overweight				
absent	153 (76.5)	246 (82.0)	8.300	0.081
insignificant	29 (14.5)	33 (11.0)		
moderate	17 (8.5)	13 (4.3)		
significant	1 (0.5)	8 (2.6)		
BP				
norm	83 (41.5)	126 (42.0)	0.963	0.618
reduced	11 (5.5)	11 (3.7)		
elevated	106 (53.0)	163 (54.3)		
attitude to food (excessive consumption)				
excessive	75 (37.5)	86 (28.7)	10.304	0.006
moderate	110 (55.0)	204 (68.0)		
not enough	15 (7.5)	10 (3.3)		
diet (compliance)				
not observed	130 (65.0)	155 (51.7)	8.704	0.003
observe	70 (35.0)	145 (48.3)		

According to the obtained results, probable possible effects on the development of BS of adherence to the nutritional regime were established (a significant number of MG persons who did not adhere to such a regime were determined – 155 (51.7%); $\chi^2=8.704$, $p=0.003$) and excessive food consumption (a significant the number of MG persons who consumed food overtime – 86 (28.7%); $\chi^2=108.304$, $p=0.006$) (*Table 2*).

It should be noted that an improbably ($\chi^2=8.300$, $p=0.081$) majority (246; 82.0%) of MG persons were not overweight, compared to slight and moderate weight (33 (11.0%) and 13 (4.3%) persons). At the same time, it is improbable ($\chi^2=0.963$, $p=0.618$) that the majority of MG persons had elevated blood pressure (163 (54.3%) persons) (*Table 2*).

At the same time, among the medico-social RFs of the development of BS among the adult population, only improbable possible effects on the development of a stroke were determined (*Table 3*).

Thus, the majority (274 (91.3%); $\chi^2=0.783$, $p=0.376$) of the interviewees considered the sanitary condition of housing to be satisfactory. Wet cleaning was most often performed several times a week (241 (80.3%); $\chi^2=2.919$, $p=0.232$), and airing – every day (251 (83.7%); $\chi^2=2.809$, $p=0.246$) (*Table 3*).

In contrast to this, probable possible influences on the development of BS psychological RFs were determined (*Table 4*).

Thus, the majority of interviewed MG probably ($\chi^2=10.025$, $p=0.018$) noted a friendly and neutral psychological atmosphere in the work team (92 (30.7%) and 145 (48.3%) persons, respectively). Probably ($\chi^2=7.582$, $p=0.055$) a significant number of MG persons stated the presence of frequent stressful situations (every day – 60 (20.0%) persons, 1–2 times a week – 64 (21.3%) persons and less often – 109 (36.3%) persons) (*Table 4*).

The last group of RF (climatic and day mode) also determined the likely effects on the possibility of MI development (*Table 5*).

It is probable ($\chi^2=10.491$, p=0.005) that a significant number of persons who had a deterioration in their well-being due to changes in weather conditions – not often (157 (52.3%) patients) and often (74 (24.7%) persons). It was reliably established ($\chi^2=11.689$, $p=0.003$) that these changes were marked by significant drops in BP due to changes in weather conditions – not often (140 (46.7%) patients) and often (105 (35.0%) persons) (*Table 5*).

It is likely ($\chi^2=24.715$; p<0.001) that the majority of persons had insufficient sleep (32 (10.7%) individuals) and sleep disturbance (31 (10.3%) individuals); problem of falling asleep (62 (20.7%) individuals) and sleeplessness (36 (12.0%) individuals) and bad sleep (15 (5.0%) individuals) (*Table 5*).

The data we obtained regarding the main RFs of BS development are completely comparable to the results of other studies. For example, Chen N. et al. [16] conducted a meta-analysis of 29 studies with the participation of 8838 patients and studied thirteen RFs in BS associated with eating disorders. They reliably established correlations of BS with an increased risk of eating disorders (odds ratio (OR)=8.34; 95.0% confidence intervals (CI)=4.60–15.10; p<0.00001). Other studies [17] confirmed increased risks of developing BS in hypertension and in women. They found that the risk of stroke for each level of arterial hypertension was higher in women (OR=1.25; 95.0% CI 1.16–1.34) than in men (OR=1.14; 95.0% CI 1.05–1.23). Gender also had a statistical relationship with other RF: with a race, with the degree of blood pressure (systolic and diastolic) increase relative to the norm, as well as with the presence or absence of adequate hypertension therapy.

*Table 3. Medical and social RF of BS development
among MG persons compared to CG (abs, %)*

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
sanitary condition of housing				
satisfactory	187 (93.5)	274 (91.3)	0.783	0.376
not satisfactory	13 (6.5)	26 (8.7)		
wet cleaning				
once a day	9 (4.5)	24 (8.0)	2.919	0.232
several times a week	171 (85.5)	241 (80.3)		
1–2 times a month	20 (10.0)	35 (11.7)		
airing				
daily	178 (89.0)	251 (83.7)	2.809	0.246
1–3 times a week	21 (10.5)	47 (15.7)		
less often	1 (0.5)	2 (0.7)		

Table 4. Psychological RF of BS development among MG persons compared to CG (abs, %)

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
psychological situation in the team				
conflicting	45 (22.5)	40 (13.3)	10.025	0.018
friendly	68 (34.0)	92 (30.7)		
neutral	75 (37.5)	145 (48.3)		
the other	12 (6.0)	23 (7.7)		
stressful situations				
missing	31 (15.5)	67 (22.3)	7.582	0.055
every day	40 (20.0)	60 (20.0)		
1–2 times a week	62 (31.0)	64 (21.3)		
less often	67 (33.5)	109 (36.3)		

*Table 5. Climatic (with the mode of the day) RF of development of BS
among persons of MG compared to CG (abs, %)*

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
deterioration of well-being due to changes in weather conditions				
was not noted	30 (15.0)	69 (23.0)	10.491	0.005
often	74 (37.0)	74 (24.7)		
not often	96 (48.0)	157 (52.3)		

Continuation of Table 5

RF	Groups of examinees		χ^2	p
	CG (*n*=200)	MG (*n*=300)		
changes in BP due to changes in weather conditions				
were not celebrated	18 (9.0)	55 (18.3)	11.689	0.003
very often and often	94 (47.0)	105 (35.0)		
rare and very rare	88 (44.0)	140 (46.7)		
dream				
sufficient	45 (22.5)	124 (41.3)	24.715	< 0.001
insufficient	30 (15.0)	32 (10.7)		
restless	31 (15.5)	31 (10.3)		
trouble falling asleep	49 (24.5)	62 (20.7)		
insomnia	40 (20.0)	36 (12.0)		
bad dreams	5 (2.5)	15 (5.0)		
supporting an active lifestyle				
never	66 (33.0)	68 (22.7)	11.729	0.003
rarely	119 (59,5)	184 (61,3)		
often	15 (7,5)	48 (16,0)		

Conclusions

1. Five groups of RFs have been probably identified, which act according to a certain general mechanism of influence and are subject to correction by certain groups of primary prevention measures: medical-biological uncontrolled, medical-biological controlled, medical-social, psychological and climatic with a daily routine.

2. Predominance of women (55.3%; *p*=0.005) and MG patients with severe anamnesis of BS (69.0%; *p*<0.001) was probably established.

3. Serious eating disorders among MG persons were reliably determined (*p*==0.006), which were characterized by significant and excessive consumption of food (respectively, 68.0% and 28.7% of patients) and probably (*p*=0.003) non-compliance with the diet (51.7% of persons).

4. It is probable (p=0.055) that a significant percentage of MG persons with the presence of stressful situations, which were noted every day (20.0%) or 1–2 times a week (21.3%) or less often (36.3%), were found.

5. Probable (*p*=0.005) prevalence of deterioration of well-being due to changes in weather conditions among MG persons was determined (infrequent – 52.3% and frequent – 24.7%) with probably (*p*=0.003) significant drops in BP (respectively 46.7% of persons and 35.0% of patients). The presence of probable (p<0.001) sleep problems was determined, which manifested as insufficient sleep (10.7% of patients), sleep disturbance (10.3% of persons), problems falling asleep (20.7% of persons) and insomnia (12.0% persons) and bad dreams (5.0% of persons).

Conflict of interest is absent.

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ФАКТОРИ РИЗИКУ РОЗВИТКУ МОЗКОВИХ ІНСУЛЬТІВ СЕРЕД ДОРОСЛОГО НАСЕЛЕННЯ

Метою дослідження було визначення поширеності основних груп факторів ризику (ФР) розвитку мозкових інсультів (МІ) серед дорослого населення. Було обстежено 500 пацієнтів 19–91 років, які отримували реабілітаційні заходи на базі клінічного санаторію «Роща» та «Курорт Березівські мінеральні води». Пацієнтів розділили на дві групи: до основної (ОГ) увійшло 300 пацієнтів з МІ а анамнезі, до контрольної (КГ) – 200 осіб без серцево-судинних звороб. Середній вік хворих ОГ становив (56,66±9,90) років, середній вік в КГ – (57,16±10,79) років. Дослідження було проведено методом анкетування за авторською анкетою встановлення ФР розвитку МІ. Медико-статистичний аналіз був проведений непараметричними методами. Імовірність відмінностей визначали за допомогою U-критерію Манна-Уітні. Порогове значення рівня ймовірності було встановлено на рівні p=0,05. При проведенні дослідження достовірно визначено вагомі порушення харчової поведінки серед осіб ОГ, які характеризувалися значним та надмірним вживанням їжі і недотриманням режиму харчування. Вірогідно констатовано значний відсоток осіб ОГ, які зазнавали дію надмірного стресу щодня (20,0 %), 1–2 рази на тиждень (21,3 %) або рідше (36,3 %). Визначено вірогідну поширеність погіршення самопочуття на зміну погодних умов у осіб ОГ із вірогідно значними перепадами артеріального тиску. Зафіксовані вірогідні проблеми зі сном (його нестачу, неспокійність, проблеми засинання, безсоння та погані сновидіння). Таким чином, були визначені найбільш вагомі ФР розвитку МІ, які були згруповані в п'ять груп: медико-біологічні некеровані, медико-біологічні керовані, медико-соціальні, психологічні та кліматичні з режимом дня.

Ключові слова: медико-біологічні фактори ризику, медико-соціальні фактори ризику, психологічні фактори ризику, кліматичні фактори ризику.

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ФАКТОРЫ РИСКА РАЗВИТИЯ МОЗГОВЫХ ИНСУЛЬТОВ У ВЗРОСЛОГО НАСЕЛЕНИЯ

Целью исследования было определение распространенности основных групп факторов риска (ФР) развития мозговых инсультов (МИ) у взрослого населения. Были обследованы 500 пациентов 19–91 лет, которые проходили реабилитацию на базе клинических санаториев «Роща» и «Курорт Березовские минеральные воды». Пациентов разделили на две группы: в основную (ОГ) вошло 300 пациентов с МИ а анамнезе, в контрольную (КГ) – 200 человек без сердечно-сосудистых заболеваний. Средний возраст больных ОГ составил (56,66±9,90) лет, средний возраст в КГ – (57,16±10,79) лет. Исследование было проведено методом анкетирования по авторской анкете установления ФР развития МИ. Медико-статистический анализ был проведен непараметрическими методами. Вероятность отличий определяли с помощью U-критерия Манна-Уитни. Пороговое значе-

ние уровня вероятности было установлено на уровне p=0,05. В ходе исследования выявлены достоверные нарушения пищевого поведения среди лиц ОГ, которые состояли в чрезмерном употреблении пищи и несоблюдении режима питания. Достоверно констатирован значительный процент лиц ОГ, которые подвергались чрезмерному стрессу ежедневно (20,0 %), 1–2 раза в неделю (21,3 %) или реже (36,3 %). Была определена вероятность ухудшения самочувствия в ответ на изменение погодных условий у лиц ОГ со статистически значимыми перепадами АД. Были выявлены проблемы со сном (его недостаточность, беспокойный сон, проблемы засыпания, бессонница и плохие сновидения). Таким образом, были определены наиболее весомые ФР развития МИ, сгруппированные в пять групп: медико-биологические неуправляемые, медико-биологические управляемые, медико-социальные, психологические и климатические с режимом дня.

Ключевые слова: *медико-биологические факторы риска, медико-социальные факторы риска, психологические факторы риска, климатические факторы риска.*

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