

© Solyeyko O.V.

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Solyeyko O.V.

Department of Internal Medicine № 2 Vinnytsia National Pyrogov Memorial Medical University (56 Pyrogov street, Vinnytsia, Ukraine, 21018)

RISK FACTORS AND STRATEGY OF PRIMARY AND SECONDARY PROPHYLAXIS OF ARTERIAL HYPERTENSION OF RAILWAYMEN

Summary. *Studied peculiarities of arterial hypertension among the leading professions of railwaymen in order to establish professional risk factors and estimate their influence on the level of general risk. 103 patients of male sex with arterial hypertension of the 1st and 2nd stages (average age $45,6 \pm 3,43$) were examined. It was discovered that a considerable part, i.e. 55% of professional risk factors of arterial hypertension in all professional groups were noise, vibration, influence of meteorological conditions, electromagnetic field, insufficient illumination, heavy static load and high productive speed of work. For the machinists of locomotive depot these unfavorable factors included the prolonged monotony of pose during work, working during nightly shift, permanent psychoemotional tension, sedentary life related to work and permanent tension of sight. It was established that the machinists of locomotive depot were more disciplined in their attitude towards their own health in comparison to the patients with arterial hypertension of other professional groups of railwaymen which showed itself in the larger percent of visits to the doctor due to increased arterial pressure, greater awareness of complications of arterial hypertension and the lowest percent of disuse of medications in connection with the increased arterial pressure, the lowest percent of hypertensive crises and lowest mean value of systolic arterial pressure.*

Key words: *arterial hypertension, risk factors, primary and secondary prophylaxis.*

Introduction

Maintenance of health and assuring professional longevity of workers is an important condition of successful functioning of railway transport of Ukraine which is one of priority industries of infrastructure in the state. The work of persons, who are directly connected to the safety of motion, is associated with the prolonged and strong psychoemotional load, which causes a disturbance of adaptation mechanisms and regulation of arterial pressure which results in development of arterial hypertension (AH). In turn, arterial hypertension is one of the most widespread cardiovascular diseases. According to the results of the international epidemiological researches, the increased arterial pressure plays one of the major roles in the risk of development of cardiovascular complications. Arterial hypertension belongs to the problems which present fundamental basis for a cardiovascular continuum and stipulate a number of interactions in the aspect "reason-consequence" [Williams, 2010]. Monitoring of the dynamics of indexes of spreading of arterial hypertension in Ukraine showed their steady increase [Lushchik and others, 2010]. However, one should note that the increase in patients with cases of arterial hypertension is not the only reason of certain tendency, it is a sign that the quality of examination of patients in medical and preventive establishments of different levels has improved.

In spite of it, there are few works in scientific literature which are devoted to the detailed analysis of arterial hypertension of workers of leading specialities of railway transport [Kovalski and others, 2010]. Data in relation to the sickness rate of arterial hypertension of workers of locomotive brigades is contradictory and was received on the basis of current documents or is based on the study of small samples [Kaptsov, Vilik, 2008].

The recommendations of World Health Organization and International society of hypertension examine in detail the matter of determining risk factors of cardiovascular diseases

and operations for concrete patients suffering from arterial hypertension and decrease of influence of these risk factors, clinical examination of patients, treatment of high arterial hypertension, treatment of arterial hypertension in patients suffering from diabetes mellitus. Unlike previous recommendations of World Health Organization, where the examination of patients was conducted by the stage of development of disease (affection of target organs, development of clinical complications), the new edition emphasizes the estimation of risk of appearance of cardiovascular complications and, accordingly, stratification of patients in accordance with the certain level of risk [Radchenko, Syrenko, 2009].

The Data of epidemiological researches shows that prevalence of cardiovascular diseases is related to the level of risk factors among the groups of population [Gorbas, 2009]. It is related to biological characteristics which can not be changed, i. e. unmodified factors, and factors which can be corrected or modified. The latter are of interest due to possible prophylaxis of arterial hypertension, and the first group of factors can be used for prognostication of origin and progress of disease [Radchenko, Syrenko, 2009]. Screening of traditional risk factors (diabetes mellitus, increased level of cholesterol and triglycerides in blood serum, smoking and etc.) allows to discover only about half of persons in a population which will be subject to the disease in the future. It predetermines the search of other factors among which psychoemotional disorders occupy an important place [Lushchik and others, 2010]. Conception of risk factors is leading in preventive cardiology as modern international experience demonstrates that measures for correction of risk factors allow to achieve the improvement of "population health", reduce sickness rate and death rate [Gorbas, 2009]. The strategy which is based on determination of general risk, i. e. the risk of complications, which this patient has due to increase of arterial pressure, presence of

concomitant cardiovascular diseases, affection of target organs and basic risk factors. Such risk is called additional in comparison to average in a population. Several groups of risk are distinguished: average in a population, low additional, high additional and very high additional [Radchenko, Syrenko, 2009]. Due to this in a population of railwaymen, work of which is related to safety of motion, research of professional stigmas requires special attention in the complex estimation of risk factors of arterial hypertension.

The study of peculiarities of arterial hypertension became the aim of our research among the leading professions of railwaymen for selection of professional risk factors; as well as estimation of efficiency of antihypertensive therapy in these categories of railwaymen for improvement of strategy of primary and secondary prophylaxis and reducing the level of general risk of arterial hypertension.

Materials and methods

On the basis of central clinical hospital of the station of Vinnitsa during the period of 2009-2011 we examined 103 patients, railwaymen, which were diagnosed with arterial hypertension in accordance with classification of the Ukrainian association of cardiologists (2008). The average age of the examined patients was $45,6 \pm 3,43$. The average duration of disease was from 0,5 to 8, on the average of $3,78 \pm 1,96$. Patients with secondary arterial hypertension were excluded. Patients were divided into three groups depending on the character of labour activity: railway tracklayers formed the first group - 35 (34%), machinists of electric locomotive formed the second group - 31 (30%), and railway shiftmen: house-painters, carpenters, attendants, equipment works formed the third group - 37 (36%). All three groups were presented only by male population due to gender-conditioned work specificity. The average age of examined was the highest among the patients of the third group, the lowest was among the patients of the third group which is related to different regulations of retirement age among these professions of railway transport. The control group consisted of 27 persons of analogical age categories, i.e. railwaymen of the examined professions which were not suffering from arterial hypertension. The comparison group consisted of 26 patients with arterial hypertension of the analogical age category which were not railwaymen.

Full clinical and instrumental examination of patients was conducted according to recommendations of the Ukrainian association of cardiologists for prophylaxis and treatment of arterial hypertension (2008) and is supplemented with the list of examinations in accordance with the order of performing medical examinations of workers of certain categories of railway transport, underground passages and enterprises of interbranch industrial railway transport of Ukraine. Additionally epidemiological and sociological methods were used for establishing the risk factors of arterial hypertension and professional stigmas. In particular, a special questionnaire created by us was used for establishing the factors which influence on the clinical course of arterial

hypertension. A questionnaire consisted of five sections which accordingly give an opportunity to estimate: general information about a patient and his disease, presence of concomitant pathology, individual peculiarities taking into account the modified risk factors, professional factors and level of awareness in the patients of the problem of arterial hypertension. During the conducted questioning questions were asked in order to analyse the prevalence of several risk factors in persons, the work of which is related to motion of trains. In questioning also took into account the estimation by the patients of peculiarities of parameters of their labour process. The results were processed statistically using Student's t-criterion and Microsoft Excel. Changes at $p < 0,05$ were considered reliable.

Results. Discussions

One of the most important unmodified factors was a compromised inherited history which was presented by the presence of arterial hypertension in close relatives and the presence of stroke and/or heart attack in anamnesis of close relatives. 84% of the patients from the group of railway shiftmen had a compromised inherited history in the form of arterial hypertension in close relatives, 77% of the close relatives of the tracklayers had arterial hypertension. In the group of machinists 71% had arterial hypertension in anamnesis of their close relatives. Share of strokes in anamnesis of close relatives prevailed among patients from the group of machinists making 55%, and the share of heart attacks in anamnesis of close relatives was more widespread among railway shiftmen making 41%.

Among the modified risk factors overweight (excess weight and obesity) prevailed among the patients of the second group - in 94%, and among the patients of the first and third group made accordingly 66 and 63% of the examined patients. The excessive consumption of salt with a meal was observed in 90% of the examined patients, besides, the group of railway shiftmen made the biggest share. Hypercholesterolemia was discovered in 70 % of the examined and was observed in the patients of all groups with approximately identical frequency - 68, 67 and 67% accordingly. Use of caffeine, as the modified risk factor, was observed in 34% of the polled and prevailed among the patients of the second group, i.e. machinists, which is probably explained by predominance in the working chart of this profession of labour during night shifts. Sedentary life was not a widespread enough phenomenon among the railwaymen, made 26% on the whole among the examined patients and prevailed among the patients of the second group which can be explained by the peculiarities of their professional activity. Smoking which was present among 59% of the examined patients was a more widespread factor which influenced on the value of arterial pressure, prevailing among the patients of the first group - railway tracklayers. The average number of the smoked cigarettes on a day made $11,6 \pm 0,69$. Also the consumption of alcohol, which was present among 74% of the patients and prevailed among

the patients of the first group, appeared to be an enough widespread modified factor. However, in our opinion, the systematic character of consumption of alcohol was more important than the consumption of alcohol itself. Among the patients of the third group 5% consumed alcohol almost daily which made the biggest share. One must pay attention to those patients which do not consume alcoholic beverages in general - 26%, among which the machinists of locomotive depot make the prevailing number.

The nervous and emotional state was estimated by several questions, concerning the presence of frequent stresses in life of the polled. Also a question about the presence of frequent conflicts in family was made in order to make a more complete estimation of emotional sphere of the examined patients. Also we asked the polled a question whether thinks of himself as a man with an easily excitable nervous system. 21% of the polled had frequent stresses which prevailed among the patients of the second group. Patients from easily excitable nervous system made 43% among all examined patient, and the biggest share of them was observed among the patients of the first group. 22% of the patients had frequent conflicts in family and railway shiftmen made the biggest share of them.

Railway professions belong to the category of harmful, i.e. such which are connected with influence of unfavorable productive factors on the organism. Therefore the next section of the questionnaire compiled by us helped to determined professional stigmas which influence on a worker at his

workplace. Among the patients of the first group the biggest share, i.e. 71%, worked during an 8-hour working day, 12-hour shifts were less widespread, i.e. 12%. Among the machinists the most widespread regime of labour were 2-5-day business trips, i.e. 84%. Among railway shiftmen 8-hour working day prevailed mainly in 73%, 8% of the patients worked during 12 hours, 19 % had daily duties.

Professional activity of railwaymen is related to safety of motion of trains, which depends on many objective and subjective factors which directly or indirectly change the functional state of organism of worker. The main factors are noise, vibration, influence of electromagnetic waves, increased psychoemotional tension, high responsibility for decision-making etc (tabl. 1). Negative influence of the above-indicated factors increased in the conditions of speed motion. In case of the prolonged influence these specific factors predetermine the change of the state of cardiovascular, endocrine, central nervous and other systems, predetermine stress, worsen the adaptational capacities of the organism. The analysis of structure of professional stigma, presented in a table, showed that constant psychoemotional load, related to work, is felt 84% of the examined patients the biggest share of which are machinists. Permanent tension of sight was observed among 45% of the railwaymen, sedentary life, which is related to productive activity, in 34% railwaymen. Besides, both of these professional stigmas prevailed considerably among machinists. Labour during night shift was registered among all examined machinists. Tracklayers

Table 1. Professional stigmas of risk of arterial hypertension in railwaymen, in 100 polled persons (n=103).

Professional stigmas of risks	Group of patients							
	Total		1 st group - track technicians		2 nd group - machinists		3 rd group - railway shiftmen	
	n=103	%±m	n=35	%±m	n=31	%±m	n=37	%±m
Permanent psychoemotional tension	84	81,5±3,8	32	91,4±4,8	31	100±1,8	21	56,7±8,1
Permanent tension of sight	45	43,7±4,9	6	17,1±6,4	30	96,8±3,2	9	24,3±7
Permanent tension of hearing	57	55,3±4,9	21	60 ±8,3	20	64,5±8,6	16	43,2±8,1
Sedentary life	33	32,1±4,6	1	2,8±2,8	28	90,3±5,3	4	10,8±5,1
Prolonged monotony of pose during work	38	36,8±4,7	2	5,7±3,9	30	96,8±3,2	6	16,2±6,1
Labour during night shifts	44	42,7±4,9	6	17,1±6,4	31	100±1,8	7	18,9±6,4
Heavy static load	53	51,4±4,9	35	100±1,7	-		18	48,6±8,2
Influence of noise	66	64±4,7	35	100±1,7	31	100±1,8	-	
Influence of vibration	66	64,1±4,7	35	100±1,7	31	100±1,8	-	
Influence of meteorological conditions (low and high temperatures, insolation, overexposure to hear)	82	79,6±3,9	35	100±1,7	31	100±1,8	16	43,2±8,1
High productive speed of work	35	33,9±4,6	35	100±1,7	-		-	
Electromagnetic field	82	79,6±3,9	35	100±1,7	31	100±1,8	16	43,2±8,1
Contaminated air	83	80,5±3,9	35	100±1,7	30	96,7±3,2	18	48,6±8,2
Insufficient illumination	32	31,1±4,6	32	91,4±4,7	-		-	

Note. Divergences between indexes for the patients of the 1st and 2nd groups are statistically reliable ($p < 0,05$), also for the 2nd and 3rd groups, as well as for the 1st and 3rd groups.

and machinists were most influenced by noise, vibration, electromagnetic field. The analysis of risk factors in the comparison group and estimation of questionnaire of control group showed that professional stigmas made 55% from the level of general risk of arterial hypertension. Permanent influence of these factors predetermines premature pathological changes of heart and vessels and serves as a reason of the increased frequency of arterial hypertension in the population of railwaymen.

Determination of mean values of arterial pressure showed that average systolic arterial pressure was higher among railway shiftmen, i.e. $147,6 \pm 1,99$ mm Hg; among the tracklayers it made $143,0 \pm 1,57$ mm Hg; among the machinists $142,4 \pm 1,81$ mm Hg. Average diastolic arterial pressure in the group of railway shiftmen was the lowest, i.e. $84,0 \pm 1,12$ mm Hg, but prevailed among patients from the group of tracklayers, i.e. $88,8 \pm 1,64$ mm Hg, and among machinists - $87,8 \pm 0,66$ mm Hg. Analysis of duration of disease of arterial hypertension of railwaymen showed that among the patients of the 1st group, i.e. tracklayers, the identical number, i.e. 26% suffered from disease for the average of 1-3 years and 26% for 5-10 years. Among the 2nd group, i.e. machinists, 35% have been ill for the average of 1-3 years, among the patients of the 3rd group, i.e. railway shiftmen, this tendency is observed in 27% of the patients which have been suffering from arterial hypertension during 1-3 years.

The analysis of presence of hypertension crises in patients as an additional estimation of control of arterial hypertension and efficiency of treatment showed that $17,4 \pm 3,7\%$ of the patients from all examined railwaymen had a marked presence of hypertension crises in their anamnesis. The biggest share of them was made by the 3rd group, i.e. railway shiftmen ($24,0 \pm 7,1\%$). Among the group of the tracklayers the presence of hypertension crises was marked at $20,0 \pm 6,8\%$, the machinists had the lowest frequency of hypertension crises ($6,0 \pm 4,3\%$).

In order to estimate the level of knowledge of patients about arterial hypertension we included questions about complications into the questionnaire which appear in case of uncontrolled arterial hypertension, list of examinations, which it is necessary to pass for the patients suffering from arterial hypertension, and levels of arterial pressure, which are safe for such patients. During the analysis of data related to the awareness of safe levels of arterial pressure for patients suffering from arterial hypertension $57,0 \pm 8,4\%$ of the patients from the 1st group gave a sufficient answer, the patients of the 2nd group appeared more well-informed $61,0 \pm 8,8\%$ and only $37,0 \pm 7,9\%$ from the patients of the 3rd group know about safe levels of arterial pressure. Patients from the group of machinists ($58,0 \pm 8,8\%$) appear to be the most well-informed among respondents in relation to the list of examinations which must be passed by a patient suffering from arterial hypertension.

While answering a question, whether the examined patients knew about complications which appeared in case of uncontrolled arterial hypertension, we discovered appeared,

that the most well-formed in this relation were the machinists $71,0 \pm 8,1\%$ of which gave a sufficient answer. $66,0 \pm 8,1\%$ in the group of tracklayers and $35,0 \pm 7,8\%$ in the group of railway shiftmen showed awareness of this aspect.

The analysis of structure of complications that the examined patients marked, showed that the patients listed the following symptoms and nosologies among the complications of arterial hypertension: headache (13%), dizziness (6%), migraine (2%), stroke (42%), heart attack (37%).

A patient's wish to be treated is very important for complex estimation of risk factors, epidemiology of arterial hypertension and estimation of efficiency of antihypertensive therapy factors. The results of questioning showed that $37,0 \pm 4,8\%$ of the examined have not visited a doctor in connection with the increase of arterial pressure. If we examine direct values in groups, then it is possible to make a conclusion that the workers of the 2nd group are most responsible in this sphere, among whom only $19,0 \pm 6,8\%$ did not visit a doctor in connection with increase of arterial pressure. And among the 3rd group, i.e. railway shiftmen, this percentage made $60,0 \pm 8,1\%$.

The analysis of situation in relation to taking antihypertensive medications in the examined patients showed that $24,0 \pm 4,2\%$ among all examined patients had not taken medications in connection with increase of arterial pressure. The smallest share of patients which had not taken medications in connection with increased arterial pressure was among the examined machinists ($3,0 \pm 3,1\%$), the biggest share was among the group of railway shiftmen ($46,0 \pm 8,2\%$).

Among the patients which followed antihypertensive treatment, we determined whether they took it systematically or in case of necessity. $41,0 \pm 4,8\%$ of the examined railwaymen followed antihypertensive treatment systematically, $35,0 \pm 4,7\%$ in case of necessity, other patients didn't take antihypertensive treatment. The detailed analysis in groups showed that the systematic antihypertensive treatment had been observed in $81,0 \pm 7,1\%$ machinists, a smaller share of patients was discovered among the tracklayers, i.e. $31,0 \pm 7,8\%$, and only $22,0 \pm 6,8\%$ of the patients among the railway shiftmen wanted to be treated systematically.

The structure of intake of antihypertensive preparation was mostly represented by the inhibitors of angiotensin converting enzyme of both short and prolonged action, i.e. 60%, 1% was made by calcium channel blocking agents, 1% by diuretic preparations, 5% by beta-blockers, 3% by blockers of receptors of angiotensin II, i.e. by the groups of preparations belonging to antihypertensive preparations of the first line. Others, i.e. 30% of the preparations taken by patients belonged to preparations of the second line, which were represented by alpha-1-blockers, snakewood alkaloids, agonists of alpha receptors of central action (26%), or to sedative preparations, i.e. valerian and validol (4%). The combined therapy was received only by 7% of the patients, which was represented by combination of calcium antagonists with angiotensin converting enzyme in 1%, diuretics with angiotensin converting enzyme in 1% and beta-blockers, diuretics and antagonists of calcium in 5%.

According to the data of the Ukrainian association of cardiologists for a prophylaxis and treatment of arterial hypertension in 2011 among the persons with increased arterial pressure in Ukraine 63,4% of the patients know about the presence of disease, 37,5% are treated, and efficiency of treatment makes 14,2%. A so-called "rule of half" works not identically in the different professional environment of the South-west railway. It is stipulated, first of all, by connection of professional activity of railwaymen with safety of motion of trains, which depends on many objective and subjective factors which in combination create a high and moderate risk of fatal cardiovascular events for the next 10 years. The most responsible in prevention and treatment of arterial hypertension are the machinists of locomotive depots, among which only 28,6±7,6% didn't apply for medical help in connection with the increased arterial pressure and only 3,0±3,1% did not use medications in connection with increased arterial pressure. This phenomenon is probably connected with the fact that the workers of the 2nd group, i.e. machinists, are directly related to the safety of motion, and that is why the concept of the personal responsibility for these patients is expressed in a greater degree.

Conclusions and possibilities of further studies

1. Among risk factors of arterial hypertension in all professional groups of railwaymen are such professional stigma of productive environment, as noise, vibration, influence of meteorological conditions, electromagnetic field, insufficient illumination, heavy static load and high productive speed of work.

2. In the group of machinists of locomotive depot the line of unfavorable professional stigma includes the prolonged monotony of pose during work, labour during night shifts, permanent psychoemotional tension, sedentary life related to work and permanent tension of sight.

3. Machinists of locomotive depot are more disciplined

in their attitude towards their own health in comparison to other groups of patients suffering from arterial hypertension, i.e. workers of the South-west railway, which shows the greater percent of appeals for medical help in connection with increased arterial pressure (71,4%), greater awareness of complications of arterial hypertension (71,0%), systematic use of antihypertensive therapy, the smallest share of refuse to take medications in connection with increased arterial pressure (3%), the smallest share of hypertension crises (6%) and most low mean value of systolic arterial pressure (142,4±1,81 mm Hg).

4. The railway shiftmen appeared to be the least disciplined railwaymen. Among them was discovered the biggest share of patients which did not apply for medical help in connection with arterial hypertension (60%) and did not accept treatment (46%), had a low level of awareness of complications of arterial hypertension (35%), which was accompanied by the highest level of systolic arterial pressure among all examined groups (147,6±1,99 mm Hg), by high frequency of hypertension crises (24%) in the conditions of the lowest influence of factors of productive environment. In this category of the examined attention must be sent to sanitary and education work.

5. The use of the special questionnaire, which includes a question in relation to the awareness of patients of arterial hypertension and its complications, their attitude towards treatment, allows to optimize the estimation of efficiency of antihypertensive therapy for the railwaymen suffering from arterial hypertension.

Research results supplement positions in relation to realization of primary and secondary prophylaxis of arterial hypertension among patients working on a railway transport, careful professional selection during admission to work, related to safety of motion. Permanent monitoring of risk factors helps to detect patients with a high risk at the early stage and monitor dynamically their state of health.

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Солейко О.В.

ФАКТОРИ РИЗИКУ ТА СТРАТЕГІЯ ПЕРВИННОЇ ТА ВТОРИННОЇ ПРОФІЛАКТИКИ АРТЕРІАЛЬНОЇ ГІПЕРТЕНЗІЇ У ПРАЦІВНИКІВ ЗАЛІЗНИЧНОГО ТРАНСПОРТУ

Резюме. Вивчені особливості артеріальної гіпертензії серед провідних професій залізничників для виявлення професійних факторів ризику та оцінки їх впливу на рівень загального ризику. Обстежено 103 пацієнти чоловічої статі з артеріальною гіпертензією I та II стадій (середній вік 45,6±3,43 роки). Виявлено, що значну частину - 55% серед професійних факторів ризику артеріальної гіпертензії в усіх професійних групах складала шум, вібрація, вплив метеорологічних умов, електромагнітне поле, недостатнє освітлення, тяжкі статичні навантаження та високий виробничий темп роботи. У машиністів локомотивного депо до цих несприятливих факторів приєднувались тривала одноманітність пози під час роботи, праця в нічну зміну, постійне психоемоційне напруження, малорухомий спосіб життя, що пов'язаний із роботою, та постійне напруження зору.

Виявлено, що машиністи локомотивного депо є більш дисциплінованими за ставленням до власного здоров'я у порівнянні з пацієнтами із АГ інших професійних груп залізничників, що проявляється більшим процентом звернень за медичною допомогою у зв'язку із підвищеним АТ, більшою обізнаністю щодо ускладнень АГ, найменшим процентом невживання лікарських засобів у зв'язку з підвищеним АТ, найменшим процентом гіпертонічних кризів і найнижчим середнім показником систолічного АТ.

Ключові слова: артеріальна гіпертензія, фактори ризику, первинна та вторинна профілактика.

Солейко Е.В.

ФАКТОРЫ РИСКА И СТРАТЕГИЯ ПЕРВИЧНОЙ И ВТОРИЧНОЙ ПРОФИЛАКТИКИ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ У РАБОТНИКОВ ЖЕЛЕЗНОДОРОЖНОГО ТРАНСПОРТА

Резюме. Изучены особенности артериальной гипертензии среди ведущих профессий железнодорожников для выявления профессиональных факторов риска и оценки их влияния на уровень общего риска. Обследовано 103 пациента мужского пола с артериальной гипертензией I и II стадий (средний возраст $45,6 \pm 3,43$ года). Выявлено, что значительную часть - 55 % среди профессиональных факторов риска артериальной гипертензии во всех профессиональных группах составляли шум, вибрация, влияние метеорологических условий, электромагнитное поле, недостаточное освещение, тяжёлые статические нагрузки и высокий производственный темп работы. У машинистов локомотивного депо к этим неблагоприятным факторам присоединялись длительная однообразность позы во время работы, работа в ночную смену, постоянное психоэмоциональное напряжение, малоподвижный образ жизни, связанный с работой, и постоянное напряжение зрения. Выявлено, что машинисты локомотивного депо являются более дисциплинированными по отношению к собственному здоровью, в сравнении с пациентами с АГ других профессиональных групп железнодорожников, что проявляется большим процентом обращений за медицинской помощью, в связи с повышенным АД, большей осведомлённостью об осложнениях АГ, наименьшим процентом неупотребления лекарственных веществ в связи с повышенным АД, наименьшим процентом гипертензивных кризов и наиболее низким средним показателем систолического АД.

Ключевые слова: артериальная гипертензия, факторы риска, первичная и вторичная профилактика.

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Богомаз О.В., Величко Т.О.

Вінницький національний медичний університет імені М.І. Пирогова, кафедра нормальної фізіології (вул. Пирогова, 56, м. Вінниця, Україна, 21018)

ПРОСТОРОВО-ЧАСОВІ ПАРАМЕТРИ ХОДЬБИ ПРИ ЧАСТКОВО ЗМІНЕНОМУ ВЕСТИБУЛЯРНОМУ ПОТОЦІ

Резюме. Метою дослідження було встановити та проаналізувати просторові та часові параметри ходьби в практично здорових осіб юнацького віку обох статей в умовах модуляції вестибулярного сенсорного потоку, а саме при ходьбі з поворотом голови праворуч та ліворуч. Дослідження проводили за допомогою сучасної комп'ютеризованої системи GAITRite®. Встановлено, що при ходьбі з поворотом голови праворуч та ліворуч зростають швидкість, кількість кроків за хвилину та зменшуються всі значення часових показників. Структура крокового циклу ходьби з поворотом голови праворуч та ліворуч залишається без змін порівняно з такою при звичайній ходьбі.

Ключові слова: просторово-часові параметри ходьби, ходьба з поворотом голови, юнаки, дівчата.

Вступ

Регуляція рівноваги й ходьби - це складна рухова здатність, яка залучає інтеграцію сенсорної інформації від різних аферентних систем (пропріоцептивної, зорової, вестибулярної) та від умов оточуючого середовища й внутрішнього стану організму.

Інформація про орієнтацію відносно вертикальності надходить від лабіринтних та зорових рецепторів та від гравіцепторів тіла. Використання сенсорної інформації від багатьох джерел, включаючи вестибулярну, зорову та соматосенсорну системи, є ключовою особливістю для невральної регуляції як орієнтації тіла щодо вертикалі, так і стабілізації його проти зовнішніх зрушень [Maurer et al., 2000; Buschges, 2005; Rossignol et al., 2006]. Одним з можливих використань сенсорної інформації в регуляції пози є те, що різні групи сенсорів залучаються до дії згідно до джерела або швидкості позних порушень. Поріг

чутливості кожної категорії рецепторів різний. Наприклад, зорові рецептори надають чутливу інформацію, пов'язану з низько-швидкісними зміщеннями тіла, у той час як лабіринтні рецептори є чутливими до високого темпу прискорення. На сьогодні відкритим залишається питання впливу частково зміненого вестибулярного потоку на просторово-часову організацію ходьби людини. Тому, метою дослідження було встановити зміни просторово-часових параметрів ходьби в умовах модуляції вестибулярного сенсорного потоку, а саме при ходьбі з поворотом голови праворуч та ліворуч.

Матеріали та методи

Дослідження ходьби проводили за допомогою комп'ютеризованої системи GAITRite®, виробництва США (CIR Systems Inc., Clifton, NJ). Система GAITRite® є елек-