порівнянні з контрольною групою та при порівнянні з рекомендованим добовим споживанням енергії. Підвищення енергетичної цінності супроводжується зміною структури нутрієнтів за рахунок підвищеного споживання переважно жирів особами чоловічої статі з підвищеною масою тіла та жирів і вуглеводів особами жіночої статі у порівнянні з контрольною групою. У чоловіків контрольної групи підвищення енергетичної цінності харчового раціону відносно рекомендованого добового споживання енергії менш виражене, ніж у осіб з підвищеною масою тіла. Тривале існування позитивного енергетичного балансу є фактором ризику розвитку ожиріння і метаболічних порушень.

Ключові слова: індекс маси тіла, підвищена маса тіла, енергетична цінність харчового раціону, енергетичний обмін, рекомендоване добове споживання енергії.

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контрольной группой и при сравнении с рекомендованным суточным потреблением энергии. Повышение энергетической ценности сопровождается изменением структуры нутриентов за счет повышенного потребления преимущественно жиров лицами мужского пола с повышенной массой тела и жиров и углеводов лицами женского пола по сравнению с контрольной группой. У мужчин контрольной группы повышение энергетической ценности пищевого рациона относительно рекомендованного суточного потребления энергии менее выраженное, чем у лиц с повышенной массой тела. Длительное существование положительного энергетического баланса является фактором риска развития ожирения и метаболических нарушений.

Ключевые слова: индекс массы тела, повышенная масса тела, энергетическая ценность пищевого рациона, энергетический обмен, рекомендованное суточное потребление энергии.

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MORBIDITY AND PREVALENCE OF THE NERVOUS SYSTEM DISEASES IN CHILDREN OF UKRAINE

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The article presents clinical and epidemiological data on the prevalence and incidence of the nervous system diseases (hereinafter – NSD) in all regions of Ukraine from 1993 to 2019. The incidence rates of NSD in children from regions with radiological control areas were higher than the nation-wide ones and the incidence rates in children from other regions by 15.9%. The incidence of NSD in children affected by the Chernobyl accident was higher than the nation-wide by 44.5%, which does not permit to exclude the direct and indirect effects of radiation. The results of our observations on the incidence of the NSD in children of Ukraine indicate that children suffered prolonged exposure to ecotoxic factors, including radiation, have higher levels of prevalence and morbidity of the NSD, which requires specialists' attention and effective medical and diagnostic measures.

Key words: children, disability, nervous system diseases, Chernobyl disaster.

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The problem of morbidity and prevalence of the NSD in children remains relevant worldwide due to the annual increase in disability due to this pathology and the social significance of this issue [4, 7, 10]. Significant advances in the diagnostics and treatment of the NSD, including those in the spheres of neurogenetics, neuropharmacology, neuroimmunology, molecular biology, studies of nervous system's metabolism, have significantly changed the views of scientists and practitioners about the effects of environmental factors on the development and functioning of nervous system. It has also led to a better understanding of the neurobiological basis for developmental delay, cerebral palsy (hereinafter – CP), autism and demyelinating diseases [11, 13, 14].

Thus, Yevtushenko SK. (2016) note that the detection of cerebrovascular pathology is spreading every year, including in children, which is associated with abnormalities and diseases of the cardiovascular system, diabetes, vasculitis and complications due to infectious diseases [3]. This thesis sounds more relevant than ever due to the rapid spread of COVID-19 in the world.

In Ukraine, over the past 25 years, the situation with the general morbidity of children, including NSD, has changed significantly due to the influence of a number of social and environmental factors [2, 8]. One reason of this kind was the accident at the Chernobyl nuclear power plant in 1986, which led to direct and indirect radiation exposure of more than 4 million people [8]. The extent of its environmental, medical and social impact on the health of the population and the life quality of victims and those living in contaminated areas is difficult to determine today [1, 6].

The WHO emphasizes that the quality of the environment is a direct and indirect factor that determines the level of human health, and the deterioration of the environment leads to a decrease in health and quality of life. It can also lead to more than 80 diseases and types of injuries [10, 12]. Research works

on the assessment of radiation exposure effect on the nervous system status (hereinafter – CNS) mainly concerns the assessment of the growth of the nervous system's congenital malformations in the offspring of irradiated parents. The results of the study on the CNS in liquidators indicates a variety of clinical manifestations involving various CNS structures in the pathology [9]. Irradiated children were more likely to have NSD and mental disorders. They had a lower overall IQ due to a lower verbal IQ and increased of disharmonious mentality [8].

The purpose of our study was to assess changes in the morbidity and prevalence of NSD among children of Ukraine over the past 25 years to determine the possible impact of adverse environmental factors, including the impact of the Chernobyl accident (hereinafter – ChAcc) on their development.

Materials and methods. Analysis was performed on the dynamics of the morbidity and prevalence of the NSD in children from different regions of Ukraine, especially in those with areas of radiological control (hereinafter – ARC), formed more than 30 years ago as a result of the ChAcc. Methods of statistical assessment and epidemiological analysis of data presented by the Center for Medical Statistics of the Ministry of Health of Ukraine from 1993 to 2019 were used [5].

Statistical estimation methods were used, in particular U-criterion of sign ranks (Wilcoxon-Mann-Whitney test) to compare the morbidity indices of NSD children from the same regions of Ukraine at different time intervals and in different study groups. A statistical analysis was carried out on the morbidity and prevalence of NSD in the following groups of children: the total number of children in the country; children living in regions with areas of radiological control; children living in other regions of the country; children who are classified as victims of the ChAcc.

Cluster assessment of the regions of Ukraine according to the morbidity levels of children with NSD was carried out by the method of k-means due to the ratio of morbidity levels among children with NSD to the nation-wide index and the distribution of regions in the country according the ARC presence. The correlation between the amount of lead emissions into the atmosphere and the number of newly diagnosed cases of NSD in children was estimated. Lead linear relationship and to determine the correlation and possible relationship between lead emissions from stationary air pollution sources and the incidence emissions were determined according to the data of the annual statistical collection of the State Statistics Service of Ukraine for 2017 [12].

The Spearman's rank correlation coefficient was used to establish and prevalence of NSD in children from different regions. Statistical processing of the study results was performed using the software product STATISTICA 6.1 and Excel-2010.

The study was carried out in compliance with the main provisions of the ICH GCP and the Helsinki Declaration on the Ethical Principles of Medical Research Relating to Human Subjects and its Revisions (Seoul, 2008), the Council of Europe Convention on Human Rights and Biomedicine (2007), recommendations of the Bioethics Committee at the Presidium of the National Academy of Medical Sciences of Ukraine (2002) and the relevant meeting of the Ethics Committee at the Bogomolets National Medical University.

Results of the study and their discussion. According to the Center for Medical Statistics of the Ministry of Health of Ukraine, the morbidity in children aged 0-17 years for the NSD in 2017 amounted to 132,354 new cases of NSD or 17.38 per 1000 children (of which NSD were first detected in 21 807 children of the first year of life or in 60.93 cases per 1000 people).

In 1993, 458944 cases of NSD were first detected, or 42.1 per 1,000 children aged 0-14 years. Note that over 25 years, the rate of reduction in the NSD morbidity in children aged 0-14 years was 73.9%. It is of interest that the adult population had a different trend – there was an increase in neurological pathology in the country almost twice [5].

The positive trend in the lower morbidity and likelihood of chronic neurological pathology in children of early preschool and school age may be due to the positive impact on their health through the use of modern perinatal technologies. However, the decrease in the incidence of could be due to a decrease in the level of diagnosing NSD, as well as due to reduced availability of specialized healthcare facilities in the regions, including remote and mountainous areas. This indicates the need to staff the pediatric neurological service of Ukraine and to improve the provision of specialized health care facilities with the necessary medical equipment.

The prevalence of NSD in children was 390,999 cases or 51.34 per 1,000 population. In 1993, the total of 790,338 cases of NSD were detected, or 72.5 per 1,000 children. Note that over 25 years, the rate of decrease in the prevalence of NSD in children aged 0-14 years was – 29.2%. 97,863 cases of NSD or 30.97 per 1,000 population were registered in children aged 0 to 6 years.

The maximum detection of children NSD was observed in children aged 7-14 years, where it amounted to 164,815 cases or 48.83 per 1,000 population. This amounted to 42.15% of the total number of registered NSD in all age groups. In adolescence, there was a maximum prevalence of NSD in children. The total of 128,321 cases or 118.8 per 1,000 population were registered, representing 32.8% of the total

number of registered NSD in all age groups. Within the same age group, the incidence of NSD was 33094 of newly diagnosed NSD cases or 30.06 per 1000 children, which was twice exceeding the level of young and school-age children.

Data on the increase in the prevalence of diseases with age due to the accumulation of chronic diseases are confirmed by the age-related change in the index of NSD accumulation – 2.02 among children including those aged 0–6 years, 3.24 among children aged 7–14 years and 3.87 among adolescents.

The structure of neurological diseases in childhood is now dominated by perinatally caused injuries of the nervous system, CP, epilepsy and epileptic syndromes, infectious impairments of the nervous system, the effects of postnatal traumatic brain injury, hereditary diseases of the nervous system, metabolic diseases with the nervous system impairment [3, 4].

Among children in 2017, 634 cases of CP or 0.08 per 1,000 population were first detected, of which 36 cases were in children under one year. The prevalence of this complex pediatric neurological pathology among infants was 16,099 cases or 2.11 per 1,000 population. Among the etiology of this pathology in half of the cases there are factors associated with perinatal pathology – miscarriage, abnormal pregnancy, complicated childbirth, neonatal diseases. Currently, the world mean incidence of CP is 2.5 per 1 thousand children [3]. This testifies to the efficacy of early prenatal diagnosis of such conditions in Ukraine and the proper potential of the pediatric neurological service.

Also, 3,014 cases of epilepsy or 0.40 per 1,000 population were detected in children. The prevalence of this pathology was 23,583 people or 3.1 per 1,000 population. Last year, 11,644 children in hospitals were diagnosed with a traumatic brain injury (680 of them were cases in children under 1year of age); 1788 children were diagnosed with infectious-allergic impairment of the CNS (129 of them in children under 1year); in 1469 – hypertension; 639 was diagnosed with cerebrovascular disease. 74 children, 20 of them under 1 year of age, were treated with a diagnosis of acute cerebrovascular accident of hemorrhagic type in the country's hospitals. Of these, 13 children died, 4 of them – under the age of 1. Ischemic type Acute Cerebrovascular Event was observed in 8 children, two of whom died. 5 children underwent treatment for cerebrovascular disorders. 146 children who were hospitalized in 2019 were diagnosed with multiple sclerosis.

In total, 102 children died in hospitals in 2019 as a result of NSD, including 36 children under 1 year of age. In the list of rankings for the incidence of childhood diseases, NSD ranked the 8th out of 17 diseases with a share of 2.94%. In 75% of cases, the onset of neurological pathology coincides with the perinatal period [2, 7]. Almost 60% of children with disabilities from childhood are children with the NSD: epilepsy, muscular dystrophies, CP, congenital central nervous system abnormalities, etc. [4, 7].

Thus, in 2019, 25,422 children with disabilities due to NSD were first registered in Ukraine, or 33.5 per 1,000 children. Disability was first established for 181 children with NSD, which is 0.24. Among other causes of disability, NSD with a share of 15.5% are third after congenital anomalies (share – 30%) and mental and behavioral disorders (share –16.5%). The structure of disability due to NSD was dominated by CP – 12,608, epilepsy – 3,470, muscle atrophy – 1,472 and multiple sclerosis – 248 cases.

It should be noted that the highest rates of children's disability due to NSD were observed in Chernihiv region – 4.9 per 1,000 children; Transcarpathian – 4.77; Mykolaiv – 4.56; Cherkasy – 4.19. Among the 9 regions with areas of radiological control (hereinafter – ARC) in 7 regions, the level of disability due to NSD exceeded the national mean.

In 1993, the disability rate due to NSD was 38.2 per 1,000 children, which is almost slightly higher than today. The share of disability due to NSD has decreased by more than 2.5 times for 25 years, which is obviously the result of the effective implementation of modern perinatal technologies and early intervention strategies in the country [6, 8].

The largest number of NSD in 2017 was first detected in Kyiv region (26.97), Dnipropetrovsk region (24.03), Zhytomyr region (23.74), Kharkiv region (23.77), Rivne region (22.86), Ivano-Frankivsk region (22.10), Sumy (20.45). Of these regions, five – Kyiv, Zhytomyr, Rivne, Sumy and Ivano-Frankivsk – are the regions that have areas for radiological control due to contamination caused by the Chornobyl disaster. Other regions (Dnipropetrovsk and Kharkiv) with a high incidence of NSD have a developed industrial and agricultural sector with a significant load of pollutants on the environment and the child's body from 205 to 16 kg per a person, respectively [12].

The lowest levels of NSD incidence were observed in Khmelnytsky and Cherkasy regions (12.63 per 1,000 population), Poltava (12.64), Luhansk (13.06), and Ternopil (13.49) regions. In total, in 5 out of 9 regions with ARC, the incidence of NSD exceeded the national mean.

In 1993, in 7 out of 9 regions with ARC, the incidence of NSD was higher than the national mean. That is, 25 years ago, among the leading regions in terms of morbidity levels were numerically more regions with areas of radiological control. In general, the incidence of the NSD in children living in regions with areas of radiological control in the early 90's exceeded the national rates and incidence in children with NSD living in other regions of the country that did not have ARC (fig. 1).

In 339,278 children affected by the ChAcc, 8,998 cases of NSD were first detected, or 23.2 per 1,000 children, which is almost by 1.3 times more than the incidence of NSD children in Ukraine. The prevalence of NSD in children affected by the ChAcc was also high – it was 86.16 per 1,000 population and also significantly exceeded the national rate – 51.34. Among the children affected by the ChAcc, there was a high incidence of vegetative-vascular dysfunction – 4733 or 12.2 per 1000 children. The prevalence of these conditions was 206,501 cases or 53.12 per 1,000 children. Clustering of Ukrainian regions depending on the incidence of NSD and distribution of regions is given in table 1.

Low incidence of NSD in children from Cherkasy, Chernihiv, Poltava, Ternopil and Luhansk regions can be explained by insufficient detection of neurological pathology due to shortage of specialists and problems with implementation of modern medical and diagnostic technologies into the medical practice. At the same time, the leading regions in terms of the NSD prevalence are Dnipropetrovsk, Kharkiv region and the city of Kyiv, where the detection of neurological pathology is much better due to the availability of staff and equipped pediatric clinics and maternity hospitals. In addition, the possible increase in neurological pathology in children is associated with significant industrial potential and high emissions into the atmosphere, which has a negative impact on the environment [15].

Table 1

Regions of Ukraine clustering by morbidity levels of the NSD

Morbidity level in children with NSD	Regions with areas of radiological control	Regions without areas of radiological control
Areas with children's NSD incidence exceeding the national mean	Kyiv, Zhytomyr, Rivne, Ivano-Frankivsk	Dnipropetrovsk, Kharkiv
Areas with children's NSD incidence close to the national mean	Sumy, Vinnytsia, Volyn	City of Kyiv, Transcarpathian, Mykolaiv, Kherson, Odesa, Khmelnytsk, Donetsk, Lviv, Chernivtsi
Areas with children's NSD incidence lower than the national mean	Chercasy, Chernihiv	Zaporizhzhia, Luhansk, Poltava, Ternopil

As shown in fig. 1, the incidence of NSD in children aged 0-14 years in Ukraine has decreased reliably by 73.9% ($p < 0.05$). The time decrease in the prevalence index of NSD by 29.2% was unreliable ($p > 0.05$). The same trend was characteristic of NSD incidence in children from regions with areas of radiological control, which decreased by 62.70% and reached its peak value of 45.3 per 1,000 children in 1993. A decrease in the incidence of NSD by 66.7% was observed in children affected by the ChAcc. Its peak value of 70.0 per 1,000 children was observed in 1993.

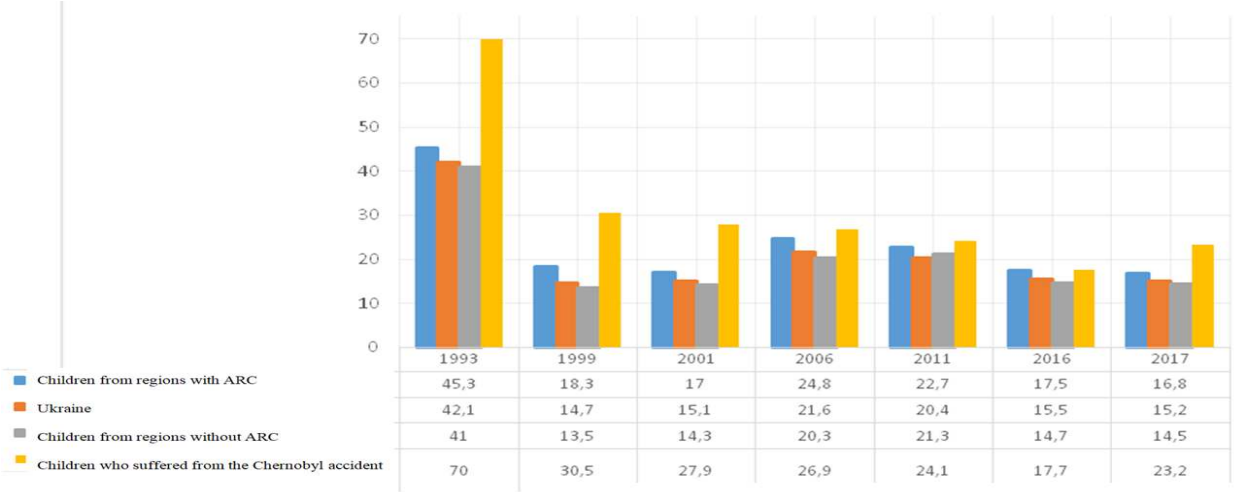

Fig. 1. Comparative dynamics of the incidence rates of the NSD in children of Ukraine, children affected by the ChAcc, children from regions with ARC, regions without ARC (1993 – 2017).

It should be noted that for more than 20 years of observation in Cherkasy, Zaporizhzhia, Chernivtsi regions there was the largest decrease in the incidence of NSD in children, respectively, – 87.3%, – 81.8%, – 80.7% compared to the incidence of NSD in 1993. At that time, in Kyiv and Zhytomyr regions the decrease in morbidity was within the range of – 21.5% – 29.8%. It is no coincidence that in these two regions with radiological control areas, a high incidence of NSD in children was observed during all the 25 years.

The incidence of NSD in children from the regions with ARC was higher than the national indices by 10.5% ($p > 0.05$) and exceeded the incidence in children from other regions by 15.9% ($p > 0.05$). The incidence of NSD in children affected by the ChAcc was higher by 47.3% than the national incidence of this pathology and by 38.1% of the incidence in the areas with ARC (fig. 1).

Apparently, children affected by the ChAcc had a high incidence of NSD during all the 25 years of observation, which significantly exceeded the rates of children from all observation groups ($p < 0.05$).

This indicates that the impact of the ChAcc on their bodies persisted in the second generation of children from parents who suffered as a result of the ChAcc. Comparing the incidence of NSD between radiation-contaminated areas and other areas, it is necessary to conclude that the main factors in the development of NSD at the moment are a set of social, psychological, environmental, hereditary and other factors. At the same time, even in contaminated areas, the role of the radiation factor decreases over time. However, the overall incidence rate of children from regions with ARC significantly exceeds the national rate [1].

A completely different and clearer picture of the ratio of NSD incidence rates in these contingents of children was observed in 1993, when the rates of children affected by the ChAcc were 66.2% higher than the national indices and by 54.5% higher than the incidence of NSD in children from radiation-contaminated areas, which in their turn exceeded the incidence of children from "conditionally" clean areas by 15.8%.

We have assessed the possible correlations between the incidence of NSD and the emissions volume for one of the most toxic to the nervous system pollutants – lead into the atmosphere from stationary and mobile sources of pollution. Thus, in 2019, according to the State Statistical Service of Ukraine, almost 70 tons of lead were discharged into the atmosphere, mostly from vehicles (in 2005 there was a maximum of lead emissions of 251.4 tons) [12]. According to the analysis, it was found that the Spearman correlation coefficient (ρ) is equal to 0.559, and the relationship between the studied features was direct and with a noticeable strength of the connection by the Chaddock scale. The number of degrees of freedom (f) was 10, but the critical value of Spearman's criterion for this number of freedom degrees is 0.587, which indicated a statistically insignificant relationship ($p > 0.05$) between the incidence of NSD and emissions of lead into the atmosphere, which in these time period also decreased due to the economic slowdown and the war in the East.

According to our study results, we report a decrease in the growth rate of NSD in children living in the areas with ARC and in children affected by the ChAcc. Obviously, this is the result of the advanced medical and diagnostic technologies implemented into modern medical practice, the effective treatment of the NSD in newborns. It is also possible that this is a consequence of the global reduction of pollutant emissions into the air of Ukraine, in particular neurotoxic lead and the reduction in time of the polluted environment's ecotoxic effects, particularly long half-life radionuclides after the ChAcc.

Conclusions

Over the last 25 years, there has been a 73.9% decrease in the incidence of NSD in children of Ukraine (0–14 years). Also in recent years, the prevalence of this pathology has decreased by 29.2%. Among children with the status of victims of the ChAcc, the incidence of NSD also decreased, but all years of monitoring exceeded the national indices of children with NSD and those living permanently in areas of the country that were contaminated by the ChAcc in 1986 year.

In children living permanently in the regions of the country that were contaminated by the ChAcc in 1986, the incidence of NSD exceeded the national rates in the early 90s and throughout all 25 years of monitoring, which requires the necessary medical and diagnostic measures in these regions.

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Реферати

ЗАХВОРЮВАНІСТЬ ТА ПОШИРЕНІСТЬ ХВОРОБ НЕРВОВОЇ СИСТЕМИ У ДІТЕЙ УКРАЇНИ

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У статті наведені клініко-епідеміологічні дані поширеності та захворюваності дітей на хвороби нервової системи в усіх областях України. Показники захворюваності на неврологічну патологію у дітей із території радіологічного контролю були більшими, ніж загальнодержавні та показники захворюваності у дітей з інших областей, що не дає можливості виключити прямий та опосередкований вплив радіаційного фактору. Результати наших спостережень свідчать, що у дітей, які зазнають тривалого впливу екотоксичних факторів, зокрема і радіаційного, спостерігаються більш високі рівні поширеності та захворюваності на неврологічну патологію, що потребує моніторингу фахівців та розробки ефективних лікувально-діагностичних заходів.

Ключові слова: діти, інвалідність, хвороби нервової системи, Чорнобильська катастрофа.

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ЗАБОЛЕВАЕМОСТЬ И РАСПРОСТРАНЕННОСТЬ БОЛЕЗНЕЙ НЕРВНОЙ СИСТЕМЫ У ДЕТЕЙ УКРАИНЫ

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В статье приведены клинико-эпидемиологические данные распространенности и заболеваемости детей патологией нервной системы во всех областях Украины. Показатели заболеваемости неврологической патологией у детей из территории радиологического контроля были выше общегосударственных и показателей заболеваемости у детей из других областей, что не позволяет исключить прямого и опосредованного влияния радиационного фактора. Результаты наших наблюдений свидетельствуют, что среди детей, имеющих длительное воздействие экотоксических факторов, в том числе радиационное, наблюдаются более высокие уровни распространенности и заболеваемости неврологической патологией, что требует мониторинга специалистов и разработки эффективных лечебно-диагностических мероприятий.

Ключевые слова: дети, инвалидность, болезни нервной системы, Чернобыльская катастрофа.

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POSTMENOPAUSAL PERIOD - AS A RISK FACTOR FOR THE DEVELOPMENT OF THE REPRODUCTIVE SYSTEM TUMORS

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The study included a retrospective analysis of the medical histories of 301 women with various tumors of the reproductive system (Average age 61.6±0.4 years). The prospective study included 306 women with benign and malignant genital tumors in the □stm□n□□us□l □r□d (Av□r□g□□g□59.3±0.4 □□rs). All □t□nts und□rw□nt g□n□l □h□gr□h□; th□l□v□ls □f st□r□d h□rm□n□s and bl□□d b□□h□m□□l □r□m□t□rs w□r□ stud□d; □nd□□t□rs □f th□□n□r m□rk□r □A-125 were determined. It was found that in patients with ovarian cancer, the body mass index was 28.7±0.6 kg / m2, in endometrial cancer 32.7±1.0 kg/m2, in benign ovarian neoplasms, the BMI was in the range of 27.3±2.0 kg/m2, in patients with endometrial hyperplastic processes 31.9±0.8 kg / m2. Patients with ovarian cancer and endometrial cancer had a high rate of artificial termination of pregnancy (29.2% and 46.8%, respectively). Thus, risk factors for the development of neoplastic processes of genitalia in postmenopausal period are: the increase in body mass index, presence of infertility in anamnesis, the presence of gynecological and endocrine diseases in the reproductive and perimenopausal periods, high frequency of induced abortion in anamnesis.

Key words: postmenopausal period, ovarian cancer, endometrial cancer, endometrial hyperplastic processes, body mass index.

The work is a fragment of the doctoral dissertation: "Pathogenetic mechanisms, clinic and modern methods of diagnostics of reproductive organ tumors in the postmenopausal period".

According to the research results, by 2030, 1 billion 200 million women will be in the postmenopausal period, and by 2060, the number of postmenopausal women will be approximately 59.8% of the total female population in the world [11]. The process of the ovaries functional activity extinction is accompanied by physiological hypoestrogeny and, accordingly, depletion of the ovarian follicular apparatus and apoptosis of germ cells (with the presence of spontaneous genetic breakdowns) [7, 8]. This process is physiological in nature and is a natural process of the body aging.

In 2011 the working group of STRAW experts determined the parameters of the female body's life periods [2]. It was found that 20% of women have peri - and postmenopausal periods have a physiological