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The tendency of brain tumor diseases in the world and the Republic of Uzbekistan

Karimova N.[1], Alimov J.[1], Anacak Y.[2]

[1]The Republican Specialized Scientific-Practical Medical Center of Oncology and Radiology, Tashkent, Uzbekistan, [2]Ege University, Faculty of Medicine, Department of Radiation Oncology, İzmir, Turkey

Correspondence:
Nargiza Karimova, The Republican Specialized Scientific-Practical Medical Center of Oncology and Radiology, Tashkent, Uzbekistan
nkskns19@gmail.com

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ABSTRACT

According to GLOBOCAN for 2020, brain tumors (BTs) are the thirteenth in the list of most fatal cancers and twenty-first in the number of newly diagnosed Cancer cases in the world. The incidence of BTs is steadily increasing both worldwide and in the Republic of Uzbekistan. Thus, in 2020, in Uzbekistan, the BTs ranked 5th in the structure of general oncological morbidity and 4th among men and 6th among women. The purpose of the study: to conduct an oncoepidemiological assessment of global trends in brain tumors and the incidence of BTs in the Republic of Uzbekistan in 2019-2020. Global trends in morbidity and mortality from BTs show differences depending on territories and the level of economic development. The presence of features depending on gender was revealed: BTs occur more often in men, the ratio of diseased men and women is 1.1:0.9. The study of the oncoepidemiological situation of BTs in the Republic of Uzbekistan has shown that the incidence of BTs tends to increase. This determines the need for further studies of territorial differences and the search for factors of the occurrence of BTs.

Keywords: brain tumors (BTs), oncoepidemiology, Republic of Uzbekistan, morbidity, mortality.

INTRODUCTION

Recently, malignant neoplasms (MNs) have become one of the main problems of medicine. The number of new cases of MNs continues to grow worldwide, exerting a huge physical, emotional and financial burden on the population and the health care system. Unfortunately, in low- and middle-income countries, the health system is not always ready to cope with this burden. According to Kachanov D.Y. et al., in-depth epidemiological analysis, taking into account anatomical localization and histological structure, is possible only on the basis of indicators of population registers, in which patient data are taken into account from the moment of initial registration of MNs until the patient's death [4]. These registers are collected from all over the world based on data from population cancer registers, which makes it possible to compare morbidity and mortality levels [4]. In terms of territorial coverage, registers can be regional, national, global [16].

Malignant neoplasms of the brain are one of the most difficult medical and social problems of modern oncology, since the disease, as a rule, is progressive, quickly leads to disability and is accompanied by a high risk of mortality [3, 7, 9].

The purpose of the study: to conduct an oncoepidemiological assessment of global trends in brain tumors (BTs) and the incidence of BTs in the Republic of Uzbekistan in 2019-2020.

METHODS

The analysis of the BTs situation in the world was carried out on the basis of GLOBOCAN data for 2020. The assessment of morbidity, trends and average annual age of patients with BTs in the Republic of Uzbekistan was carried out.

RESULTS AND DISCUSSION

Morbidity and mortality from BTs in the world Global statistics show an annual increase in cancer incidence. According to the World Health Organization (WHO), in 2020, the number of new cases is about 19.3 million annually, the mortality rate from MNs is almost 10 million with an increase rate of more than 2%, which is 0.5% higher than the growth of the world population [10, 17]. World statistics show that the share of tumors of the central nervous system accounts for 308,102 (1.6%) cases of MNs. BTs rank 21st in morbidity after lung cancer (11.4%), breast cancer (11.7%), prostate cancer (7.3%), skin cancer (6.2%), colon cancer (6.0%), stomach cancer (5.6%), liver cancer (4.7%), rectal cancer (3.8%), cervical cancer (3.1%), esophageal cancer (3.1%), thyroid cancer (3.0%), bladder cancer (3.0%), non-Hodgkin's lymphoma (2.8%), pancreatic cancer (2.6%), leukemia (2.5%), kidney cancer (2.2%), uterine cancer (2.2%), lip and oral cancer (2.0%), skin melanoma (1.7%) and ovarian cancer (1.6%).

In terms of mortality, BTsare also in 13th place (2.5%) after lung cancer (18.0%), breast cancer (6.9%), prostate cancer (3.8%), colon cancer (5.8%), stomach cancer (7.7%), liver cancer (8.3%), rectal cancer (3.4%), cervical cancer (3.4%), esophageal cancer (5.5%), non-Hodgkin lymphoma (2.6%), pancreatic cancer (4.7%) and leukemia (3.1%).

The number of newly diagnosed cancer cases and deaths, the incidence and mortality from cancer, as well as the cumulative risk of developing and dying from cancer in general and for 36 types of cancer separately for men and women were examined. Every fifth man or woman falls ill with this disease, and every eighth man and every eleventh woman die from it [17, 22, 23].

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Morbidity and mortality from BTs in the Republic of Uzbekistan.

In Uzbekistan, in the structure of oncological morbidity, BTs occupy the 6th place among all MNs. In 2020, 21976 primary cases of MNs were detected in the Republic of Uzbekistan, including 9059 (41.22%) in men and 12917 (58.77%) inwomen. The increase in this indicator compared to 2019 was - 12.1%. The incidence rate of MNs per 100,000 population in the Republic of Uzbekistan was 64.8, up 12.1% lower than in 2019 and 15.6% higher than in 2009. By the end of 2020, the number of patients amounted to 107,196 (in 2019 - 103,063), i.e. 0.3% of the country's population. Of these, rural residents accounted for 61,283 (57.2%), children aged 0-17 years - 4,505 (4.2%).

In 2020, 942 new cases of BTs were registered in the Republic of Uzbekistan, including 478 (50.7%) cases for men and 464 (49.3%) for women. The ratio of new cases of BTs among men and women was 1.1:0.9. In the structure of oncological morbidity, BTs took the 6th place, with an incidence rate of 3.5 per 100,000 (Figure 1).

It should be noted that in the morbidity structure of the male population, BTs occupy the 4th place, with an incidence rate of 3.5 per 100,000 male population, second only to neoplasms of the lungs, colorectal cancer and stomach, and of women population - the 6th position (3.5 per 100,000 female population) after breast, cervical, ovarian, colorectal cancer and stomach cancer (Figure 2) [10].

Newly diagnosed cases of brain tumors in Uzbekistan in 2020, depending on age, were registered: patients under 15 years old - 140 (14.86%), 15-17 years old - 23 (2.44%), 18-44 years old - 359 (38.11%), 45-54 years old - 167 (17.7%), 55-65 years old - 143 (15.2%) and people over 65 years old - 110 (11.7%) [10]. Hence, it is clear that it is the people of working age who are most susceptible to the incidence of BTs (Figure 3).

Localization and forms of BTs.

The localization principle involves the division of tumors into groups depending on their place of origin (by the name of the lobe / lobes of the brain or individual brain structures) and distribution in the medulla. According to epidemiological studies, the frequency of glioma lesions in various parts of the brain in adult patients is approximately: cerebral hemispheres — 70% (including: frontal lobe — up to 19%, temporal lobe — up to 13%, parietal - up to 9%, occipital - up to 2%, a combination of lesions of various lobes - about 28%); corpus callosum - 5%; subcortical ganglia — 6%; ventricles of the brain - 7%; optic nerves and chiasm — 1-1.5%; brain stem - 6%; cerebellum - 4-4.5% [11].

Intracranial lesions may be manifested by the presence of both focal and non-focal symptoms, however, these symptoms are nonspecific for a tumor of any type, and may also be a manifestation of various neoplastic processes, and not only. In this regard, without the use of clarifying diagnostic methods, it is difficult to reliably speak about the cause of these symptoms [6, 9].

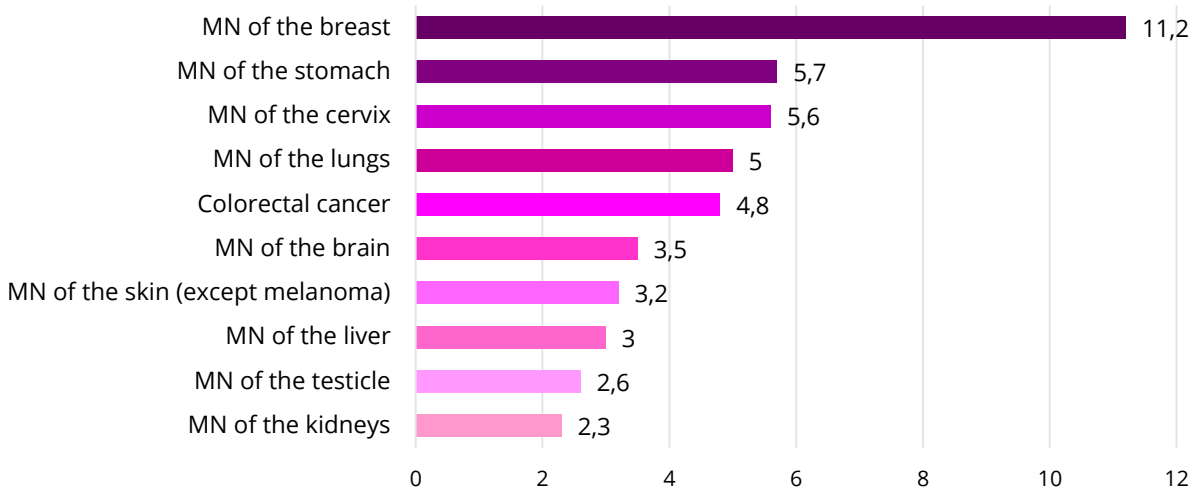

Figure 1. Structure of oncological morbidity in the Republic of Uzbekistan in 2020

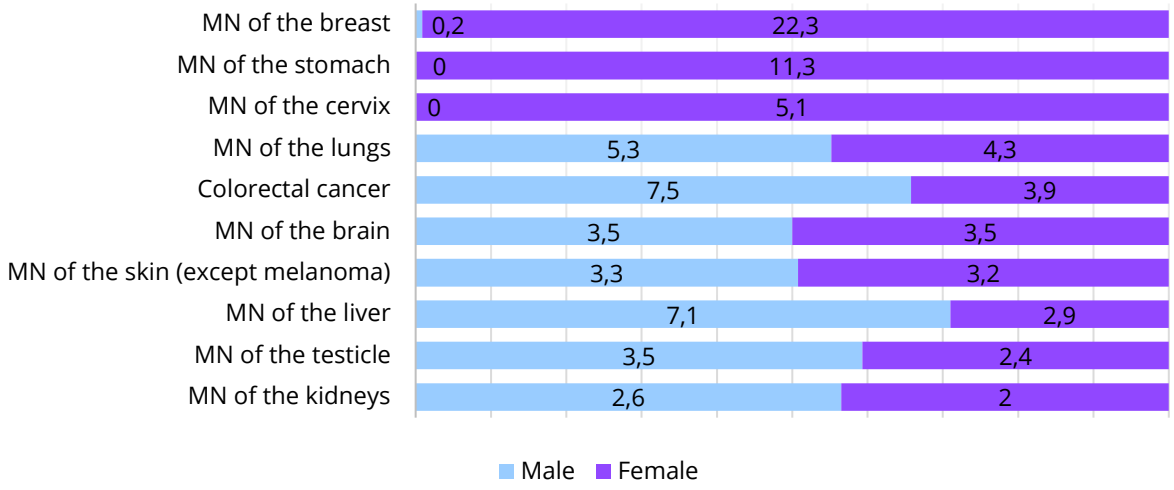

Figure 2. The structure of cancer incidence among the female and male population in 2020

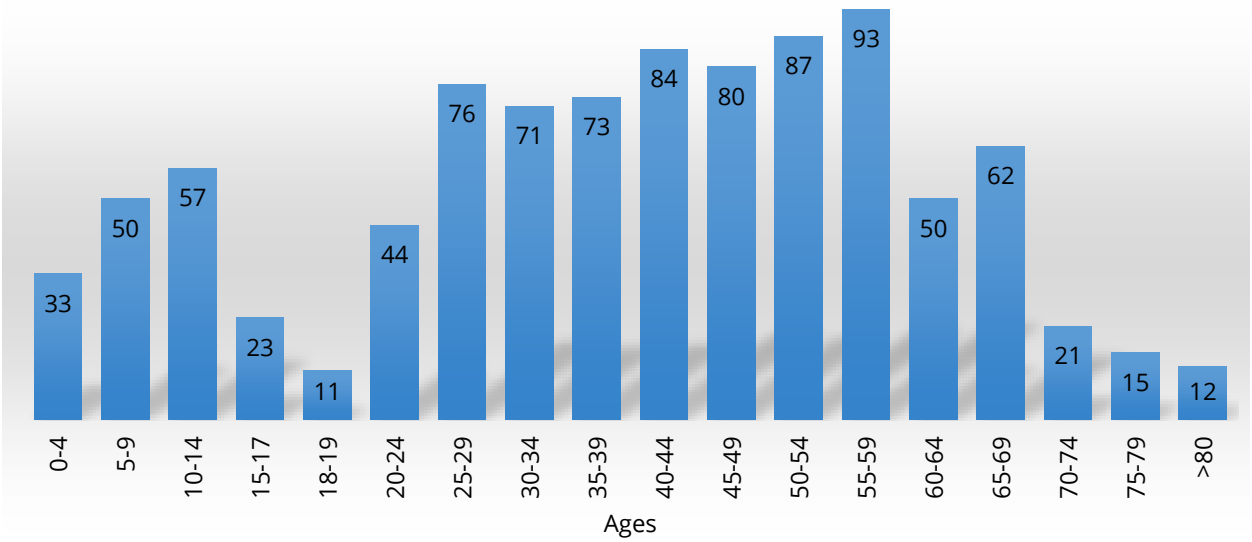

Figure 3. The incidence rate depending on age in 2020.

Risk factors of BTs

A large number of epidemiological studies around the world are devoted to the study of risk factors in the occurrence of BTs, but despite their increasing number every year, there is no clear data on the causes and degree of association of certain risk factors with the occurrence of BTs [14]. This is explained by various methods of study, insufficient number of patients to conduct statistically reliable studies, histological diversity of primary cerebral neoplasms, as well as the lack of a unified computer registry of BTs. Registered according to epidemiological studies and statistical data, the increase in the incidence of BTsis due to a number of factors.

Environmental factors

Currently, many studies confirm that one of the most important risk factors in the occurrence of BTs is ionizing radiation. Thus, a number of authors indicate that the cause of the development of glial tumors is the effect of ionizing radiation on the body in the prenatal period or in early childhood [1]. Some authors report a significant increase in BTs, especially malignant forms, in areas exposed to ionizing radiation. Also, environmental risk factors include the impact of electric and magnetic fields on people [1].

The increase in the average life expectancy, which in the social aspect should be considered as a positive factor. However, due to the increase in life expectancy, the population over the age of 60 is naturally increasing. It has been established that the incidence of BTs (mainly malignant) increases among elderly people, and at the age of over 60 years, with each subsequent 10 years of life, the probability of tumor occurrence increases by several orders of magnitude, which is due to the general biological principles of development and aging of the human body. In highly developed socio-economically countries with a longer average life expectancy of 75-85 years, higher incidence rates of BTs are also recorded [4].

Occupational hazards

According to some authors, the cause of BTs may be professional factors. For instance, Y.C. Cole et al. established a clear relationship between the occurrence of glioblastomas and the effect of N-nitrosoamines on the body of workers in the rubber industry in Wales. There was some connection between the occurrence of BTs in children whose parents worked with amino-aromatic substances, especially their mothers during pregnancy [1].

Genetic factors

The assumption that in almost all malignant tumors, when they occur and subsequent progression, there are not single, but multiple gene changes, has received experimental confirmation. In particular, the genetic factor plays an important role in the pathogenesis of meningiomas, so monosomy of the 22nd chromosome or deletion of the long arm of the same chromosome was found in 72% of patients with meningiomas [5]. Research in the field of molecular genetics of astrocytomas has made it possible to identify genetic factors that play an important role in oncogenesis. Nevertheless, specific genetic syndromes are combined with this type of tumor in a very small percentage of cases, and malignant astrocytomas are not considered, at least not yet, hereditary diseases [24].

Other possible factors

Also, factors such as smoking, alcohol, taking various medications (oral contraceptives, barbiturates), nutritional characteristics, radiation diagnostic and therapeutic manipulations, viral diseases, vaccination, peculiarities of childbirth and the course of pregnancy were studied as causes that can cause the growth of BTs, but it was not possible to identify a clear dependence for any of them [1].

The lifetime of the BTs

Despite the large number of different treatment methods proposed in recent decades, the median survival of patients with malignant forms of glial tumors (WHO grade IV) after their removal, radiotherapy (RT) and various forms of chemotherapy, does not exceed 12-15 months [21]. Thus, the life expectancy of the majority of operated patients with high-grade anaplasia gliomas did not exceed 12 months on average, and only 3.5% of them were able to overcome the 5-year mark [12]. The survival rate varies significantly depending on the histological characteristics of the tumor [20].

Gliomas with an oligodendroglial component are characterized by a long survival time, in contrast to gliomas with a pronounced astrocytic component [25]. In the course of studies of the results of treatment of certain groups of poorly differentiated astrocytomas, it was shown that early surgical resection improved the prognosis of survival in contrast to the tactics of limited biopsy or expectant treatment [18]. After RT, the median survival did not exceed 12 months, with a combination of RT and chemotherapy - 15 months. [8]. According to the literature, approximately 20–40% of patients with malignant tumors develop metastatic brain lesions [2].

Conclusion

The analysis of the prevalence of BTs shows a steady increase in morbidity and mortality depending on the location and histological structure of the tumor,

gender, age and territorial characteristics. Taking into account the neglect of the stage at the initial detection of a tumor, the issues of diagnostics of BTs in the early stages remain relevant. Improving the early diagnosis of BTswill improve the survival rates and quality of life of patients.

Conflict of Interest Disclosure

The authors declare no conflicts of interest.

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