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THE MALIGNANT TUMORS OF THE CENTRAL NERVOUS SYSTEM IN THE ARAL-SYRDARYA ECOLOGICAL ZONE OF KAZAKHSTAN: EPIDEMIOLOGICAL ASPECTS

ТҰЖЫРЫМДАМА

Жұмыстың мақсаты: Арал-Сырдария экологиялық аймағындағы орталық жүйке жүйесінің қатерлі ісігінің аурушаңдық көрсеткіштерінің ерекшеліктерін эпидемиологиялық жолмен бағалау жүргізілген.

Материалдары мен әдістері: Осы мақсатта қазіргі таңда қолданылатын онкоэпидемиологиялық зерттеудің дескриптивті және аналитикалық әдістері қолданылған.

Нәтижесі: Осының нәтижесінде көрсетілген аймақта орталық жүйке жүйесінің қатерлі ісігіне

шалдыққан науқастардың орташа жасы 39,4-ке, ал қарапайым аурушаңдық көрсеткіші – $3,9^{0/}_{0000}$ тең болған. Жас тобына байланысты ең жоғарғы көрсеткіш шыңы 50-59 жас аралығында ($11,7^{0/}_{0000}$) анықталған. Орталық жүйке жүйесінің қатерлі ісігінің аурушаңдық көрсеткіштерінің жас тобына байланысты өсу қарқыны (тренді) әртүрлі бағытта өзгеретіні көрсетілген.

Маңызды сөздер: орталық жүйке жүйесі аурулары, жас, трендылар.

ABSTRACT

Aim: In this study the epidemiological assessment of incidence rate in Kyzylorda (KZO) and the South Kazakhstan Oblast (SKO), which are geographically part of the Aral-Syrdarya ecological zone (ASEZ). Division by ecozones in Kazakhstan is connected with the same name with water-economic pools.

Materials and methods. A retrospective study for the 2004-2011 years. The data of oncological institutions of the Republic on new MT CNS were used as materials for the research. Data on population of Statistics Agency of RK were used.

Results: Age-specific incidence rates had unimodal growth with a peak of incidence rate at 50-59 years in SKO ($7.3^{0/}_{0000}$) and in the Aral-Syrdarya ecozone ($11.7^{0/}_{0000}$), while in KZO the peak was at 60-69 years ($27.1^{0/}_{0000}$). Trends of age-specific incidence rates in the last area had a tendency to decrease, whereas in the SKO incidence rate grew in each age group.

Keywords: diseases of the nervous system, age, trend.

INTRODUCTION

Epidemiological studies in neuro-oncology are necessary for understanding of the reasons of the

development and spread of malignant tumors (MT) CNS in different economic and geographic areas of

the world. The results of these studies are the basis for the planning of preventive and diagnostic and treatment measures to reduce incidence rate and mortality of population from MT CNS [1, 2]. MT CNS has a special place in the structure of incidence rate morbidity, mortality and disability, most working-age population. High social and economic damage which this pathology does to the society puts forward task of helping these patients among the most urgent in neurosurgery and health organizations. It is known that

MT CNS has different degrees of spreading in different regions of the world [3, 4, 5].

Special scientific interest cause the epidemiological studies of MT CNS taking into account environmental factors. In this study the epidemiological assessment of incidence rate in Kyzylorda (KZO) and the South Kazakhstan Oblast (SKO), which are geographically part of the Aral-Syrdarya ecological zone (ASEZ). Division by ecozones in Kazakhstan is connected with the same name with water-economic pools [6].

MATERIALS AND METHODS

A retrospective study for the 2004-2011 years. The data of oncological institutions of the Republic on new MT CNS were used as materials for the research. Data on population of Statistics Agency of RK were used [7].

As the main method in the research of the incidence rate of MT CNS a retrospective research was used with using of descriptive and analytical methods of modern epidemiology. Incidence rates are defined by the practical standard used in modern biomedical statistics [8, 9, 10]. Age-standardized rate is calculated

by the direct method, and it was used the standard of world, European and African population age structures. The dynamics of incidence rate of MT CNS was studied for 8 years, and the trend of incidence rate is defined with the method of the least squares. To calculate the annual average increase / decrease of dynamic raw the geometric mean was used. The average age of patients was calculated, mean values (P), mean error (m) and the average annual increase / decrease (T, %), 95% confidence intervals (95% CI), the cumulative risk.

THE RESULTS AND THEIR DISCUSSION

During the period under review in the Aral-Syrdarya ecological zone there were registered 931 new cases of MT CNS, 394 (42.3%) were in the KZO and 537

(57.7%) in the SKO. The distribution of patients of MT CNS by age is shown in table 1.

Table 1 – The distribution of patients of MT CNS in Aral-Syrdarya ecological zone by age groups for 2004-2011

Age groups, years	KZO		SKO		ASEZ	
	abs.	%	abs.	%	abs.	%
до 30	91	23.1	195	36.3	286	30.7
30-39	53	13.5	78	14.5	131	14.1
40-49	73	18.5	121	22.5	194	20.8
50-59	100	25.4	97	18.1	197	21.2
60-69	58	14.7	36	6.7	94	10.1
70+	19	4.8	10	1.9	29	3.1
Total	394	100.0	537	100.0	931	100.0

High percentage of patients in the studied ecozone was set for persons under 30 years old – 30.7% and at 50-59 years – 21.2%.

The average age of patients with TM CNS in whole of Aral-Syrdarya ecozone was 39.4 ± 0.6 years (95% CI=38.3-40.5 years). In the dynamics the average age has a tendency to increase with 39.7 ± 1.7 years (2004) to 41.1 ± 1.7 years in 2011. During aligning of the indicator the growth was, and the average annual

growth rate was $T=+0.3\%$ (Figure 1).

The average age of patients with TM CNS in SKO was 36.3 ± 0.9 years (95% CI=34.6-38.0 years), whereas in the KZO, the figure was significantly and statistically higher ($p<0.05$) – 43.9 ± 1.3 years (95% CI=41.4-46.5 years). In the dynamics the trends of the average age in these areas had a tendency to increase (Figure 2).

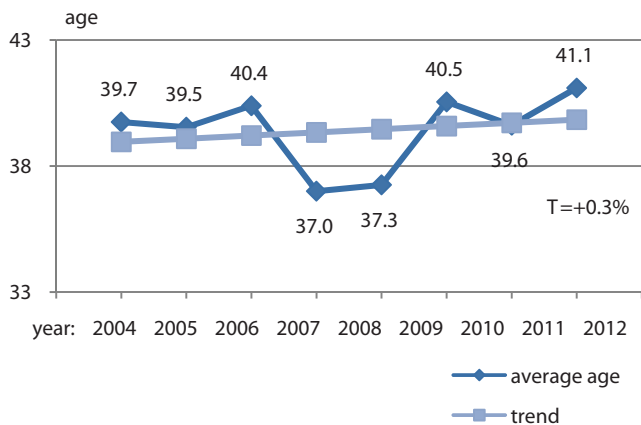


Figure 1 – Dynamics of the average age of patients with TM CNS in Aral-Syrdarya zone for 2004-2011

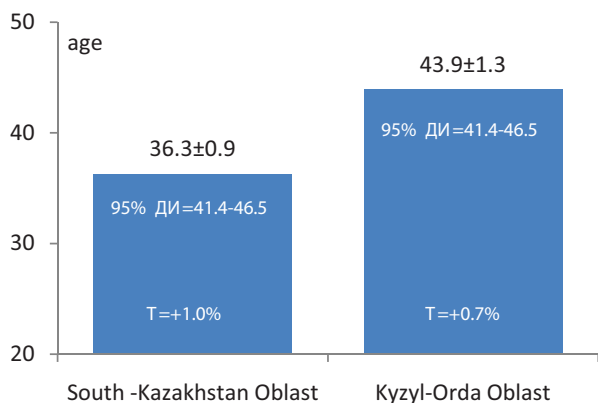


Figure 2 – The average age of patients with TM CNS in SKO and KZO for 2004-2011

Table 2 – Incidence rate of TM CNS in Aral-Syrdarya ecozone for 2004-2011

Age groups, years	Oblast						Aral-Syrdarya Ecozone		
	Kyzyl-Orda			South-Kazakh			P±m	95% CI	T, %
	P±m	95% CI	T, %	P±m	95% CI	T, %			
до 30	3.0±0.6	1.8-4.2	-10.9	1.7±0.1	1.4-2.0	+1.0	2.0±0.2	1.6-2.3	-3.0
30-39	7.4±0.9	5.7-9.1	-3.4	3.1±0.5	2.1-4.1	+6.1	4.1±0.5	3.1-5.1	+2.2
40-49	12.0±1.7	8.7-15.4	-7.7	5.6±0.6	4.4-6.8	+3.9	7.0±0.7	5.7-8.3	-0.5
50-59	26.3±4.6	17.3-35.2	-15.5	7.3±0.5	6.3-8.4	+0.7	11.7±1.3	9.3-14.2	-7.6
60-69	27.1±2.2	22.8-31.4	-6.1	5.2±1.0	3.1-7.2	+25.3	10.3±0.8	8.7-11.8	+3.9
70+	14.1±3.2	7.8-20.4	+9.7	1.9±0.4	1.2-2.7	+13.8	4.4±0.8	2.8-6.0	+12.7
Total	7.7±0.9	6.0-9.5	-7.6	2.9±0.2	2.6-3.2	+4.1	3.9±0.2	3.5-4.3	-1.1

The incidence rate of TM CNS in SKO ($2.9 \pm 0.2 / 10000$) was 2.7 times lower than in KZO ($7.7 \pm 0.9 / 10000$). The difference was statistically significant ($p < 0.05$), as their 95% CI did not overlap (Table 2).

Age-specific incidence rate of TM CNS in KZO were higher than in the SKO. Statistical difference ($p < 0.05$) was set during comparing of incidence in indicated regions almost in all ages, except among persons under 30 years, with 95% CI were overlapped (Table 2).

Equivalent curves of coefficient of «growth rate» in the incidence rate of TM CNS in SKO aged 30-39 years

The average annual crude incidence rate of TM CNS in the Aral-Syrdarya region was $3.9 \pm 0.2 / 10000$ (95% CI=3.5-4.3 $/ 10000$) and in the dynamics had a tendency to decrease, and the average annual loss alignment indicators – $T = -1.1\%$ (Figure 3).

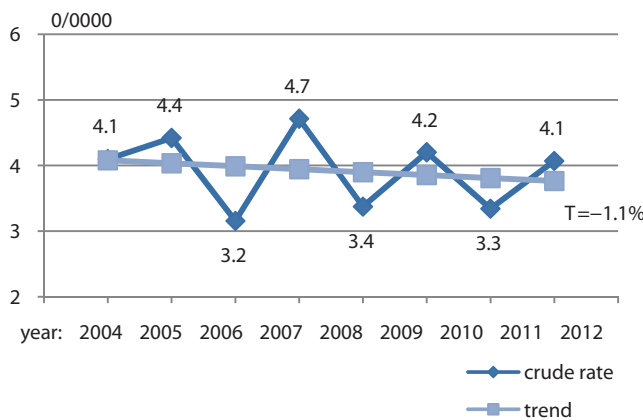


Figure 3 – Dynamics of crude incidence rate TM CNS in Aral-Syrdarya ecozone for 2004-2011

The average annual age-specific incidence rates of TM CNS had a unimodal growth peaking at 50-59 years – $11.7 \pm 1.3 / 10000$ (95% CI=9.3-14.2 $/ 10000$). Age-specific incidence rate for the whole ecozone had a tendency to grow at 30-39 years ($T = +2.2\%$), 60-69 years ($T = +3.9\%$) and 70 years ($T = +12.7\%$), while in the other age groups the indicators decreased (Table 2).

old was 1.8 times higher than to patients under the age of 30 years, and then at 40-49 years old – by 3.3 times, at 50-59 years old – 4.3 times, at 60-69 years old – by 3.0 times and at 70 years old and older – 1.1 times higher. In the analysis of the coefficient «rate of growth» of the incidence rate of TM CNS in KZO it was set that it was more expressed than in the SKO. So, at 30-39 years old, the incidence rate increased by 2.5 times in 40-49 years old – by 4.0 times, at 50-59 years old – 8.7 times, 9.0 times – at 60-69 years old and 70 years old and older – 4.7 times, compared with age 30 years old (Figure 5).

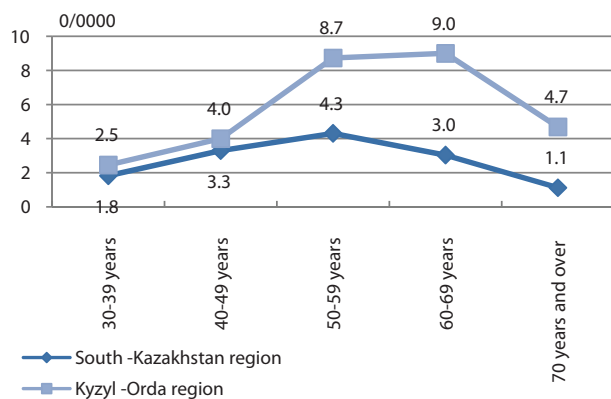


Figure 5 – The curves of the equivalent coefficient «growth rate» of age incidence rate of MT CNS in SKD and KZD for 2004-2011

With the purpose of elimination of the influence of the age structure of the population was made standardization. So, the world standard was $4.4 \pm 0.2^{0/0000}$ (95% CI=3.9-4.8^{0/0000}), European – 5.2 ± 0.3 (95% CI=4.6-5.7^{0/0000}) and the African – $3.7 \pm 0.2^{0/0000}$ (95% CI=3.3-4.1^{0/0000}). Also age-standardized rate of MT CNS were calculated in SKO and KZO (Figure 6).

We also calculated the cumulative risk. The cumulative risk is the risk of developing a particular malignancy, particularly MT CNS, which the person would be subjected during a certain period of life, in the absence of all other causes of death. It is important to identify the period of life, for which the risk is

accumulated: typically its 0-74 years, what presents the whole period of life. Thus, the cumulative risk in the Aral-Syrdarya ecozone for the studied period was $0.42 \pm 0.02\%$ (95% CI=0.38-0.46%), by regions was as follows: in SKO – $0.28 \pm 0.02\%$ (95% CI=0.25-0.31%) and KZO – $0.89 \pm 0.10\%$ (95% CI=0.69-1.09%), i.e. there was a statistically significant difference ($p < 0.05$).

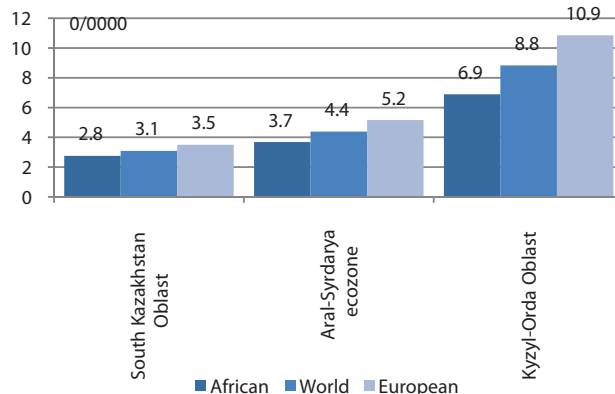


Figure 6 – Age-standardized rate of MT CNS in Aral-Syrdarya ecozone for 2004-2011

Thus, the results of the epidemiological assessment of the incidence rate of MT CNS in the Aral-Syrdarya ecozone are recommended to use the health authorities to conduct targeted cancer control of the population of the region.

CONCLUSION

1. High percentage of patients with MT CNS was more in SKO (57.7%) than in the KZO (42.3%).
2. The average age of patients with MT CNS in KZO (43.9 years) was significantly higher statistically ($p < 0.05$) than in SKO (36.3 years) and in the whole studied ecozone was 39.4 years. In the dynamics there is a tendency to «aging» of patients.
3. The average crude incidence rate of MT CNS in the Aral-Syrdarya ecozone was $3.9^{0/0000}$, by areas the incidence rate was higher ($p < 0.05$) in KZO than in SKO – 7.7 and 2.9 per 100,000 population. And the trends of incidence rate of MT CNS increased only in the last area.
4. Age-specific incidence rates had unimodal growth with a peak of incidence rate at 50-59 years in SKO ($7.3^{0/0000}$) and in the Aral-Syrdarya ecozone ($11.7^{0/0000}$), while in KZO the peak was at 60-69 years ($27.1^{0/0000}$). Trends of age-specific incidence rates in the last area had a tendency to decrease, whereas in the SKO incidence rate grew in each age group.
5. Cumulative risk of MT CNS was higher in KZO (0.89%) than in SKO (0.28%), and in general, the Aral-Syrdarya ecozone – 0.42%.

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