UDC 613.648.4:614.876(477.45):621.039.58
https://doi.org/10.31612/2616-4868.1.2024.09

POPULATION'S RADIATION ANXIETY STRUCTURE ANALYSIS FOR THE PRE-COVID-19 PERIOD

Sehrii B. Dorohańć[2], Oleksandr A. Shevchenko[1], Valeria M. Lekhan[1], Oleksiy V. Sheviakov[4], Nadia I. Operchuk[3], Natalya G. Mikryukova[2], Oleksiy M. Cherednichenko[5]

1 – Dnipro State Medical University, Dnipro, Ukraine
2 – Donetsk National Medical University, Kropyvnytskyi, Ukraine
3 – State institution «Kirovohrad Regional Center for Disease Control and Prevention of the Ministry of Health of Ukraine», Kropyvnytskyi, Ukraine
4 – Ukrainian State University of Science and Technology, Dnipro, Ukraine
5 – Khortytsia National Educational and Rehabilitation Academy, Zaporizhzhia, Ukraine

Summary

Introduction. A considerable amount of conflicting reports creates conditions for concern about the effects of radiation on health. The adequacy of the assessment of problems and responses to these challenges depends on the sources used by a person, his culture and education level, as well as the emotional overtone of this assessment.
The aim of the study is to determine dynamic changes in the prevalence and structure of population's radiation anxiety states under stable social conditions based on a psychological and hygienic assessment.
Materials and methods: In order to research and assess the perception of Kropyvnytskyi residents about the degree and prevalence of radiation anxiety states, a survey was conducted on Facebook and Instagram social networks from February to December 2019 using Google Form. For assessment of dynamic changes in radiation anxiety, data from our own studies in 2014 were used [9]. The questionnaire methodology was based on the principles of the previously tested and patented «Methodology for determining radiation anxiety among the population» and the monograph «Radiation anxiety among the population». Three hundred and twenty four residents of Kropyvnytskyi aged 18 to 73 were included in the study, 155 (47.8 %) men and 169 (52.2 %) women. The average age of the interviewees (Me (LQ; HQ)) was 27 (20; 33) years old.
Results. A specific psycho-emotional state is developed and maintained at some level in the residents of cities with nuclear power plants – radiation anxiety, which is manifested by a complex of neuropsychological and somato-physiological disorders against the fear of ionizing radiation sources background. At the same time, such a psychogenic effect may not be related to the degree of actual effects of ionizing radiation on human health. It was determined that in 2019, before the COVID-19 pandemic and Russia's full armed aggression against Ukraine, more than 90 % of the surveyed residents of Kropyvnytskyi, regardless of gender and age, were concerned about potential radiation pollution of the environment and foodstuffs, medium level of radiation anxiety was in 34,9 %, and high level in 14.8 %. Low radiation anxiety was detected in 41.4 % of respondents, and in 8.9 % it was absent.
Conclusions. Over 5 years (from 2014 to 2019), there were noticeable negative changes in the structure of the radiation anxiety states among the surveyed urban residents, namely: the amount of people without signs of radiation anxiety halved (8.9 % vs. 16.0 %) and respondents with the high level of this psycho-emotional state increased almost four times (14.8 % versus 3.9 %). The obtained results encourage the authors to future studies of specific radiation anxiety states among the population to clarify their dynamics.

Keywords: **radiation anxiety, depression, anxiety, uranium mining, uranium mines, nuclear fuel cycle companies**

INTRODUCTION

The population's recognition of danger from the facilities of the nuclear energy complex causes anxiety, changes the perception of reality and people's life planning, forms a complex of specific psycho-emotional reactions in the population, which is denoted by the term «radiation anxiety». A considerable body of conflicting reports creates conditions for concern about the effects of radiation on health. The adequacy of the assessments of problems and responses to these challenges depends on the sources used by a person, his culture and education level, as well as the emotional overtone of this assessment. Emotional consequences of radiation anxiety states include depression, unrest, anxiety, post-traumatic stress disorders, and medically unexplained secondary somatic symptoms [2, 9].

As shown in our previous publications, the population's radiation anxiety is actively developed even in the absence of other, exceptional and larger social perturbations. In this regard, the 2019 became a watershed for Ukraine between a state of relative stability, even under permanent low-intensity military operations in the east, and subsequent specific and social catastrophes – the COVID-19 pandemic (2019-2022) and explicit Russian military aggression, which continues to this day. Therefore, it was important to find out whether the prevalence and quality of a specific psychological state of the population (radiation anxiety) changes under relatively stable social circumstances, in particular, in the absence of specific and social problems – epidemics, wars, etc. [3].

THE AIM OF THE STUDY

To find out the dynamic changes in the prevalence and structure of radiation anxiety states among the population under stable social conditions on the basis of a psychological and hygienic assessment.

MATERIAL AND METHODS

In order to research and evaluate the perception of Kropyvnytskyi residents about the degree and prevalence of radiation anxiety states, a survey was conducted on Facebook and Instagram social networks from February to December 2019 using Google Form. For subsequent assessment of dynamic changes in radiation anxiety, data from our own studies in 2014 were used [9]. The questionnaire methodology was based on the principles of the previously tested and patented «Methodology for determining radiation anxiety among the population» and the monograph «Radiation anxiety among the population» [9]. Three hundred and twenty-four residents of Kropyvnytskyi city aged 18 to 73 included in the study – 155 (47.8 %) male and 169 (52.2 %) female. The average age of the interviewees (Me (LQ; HQ)) was 27 (20; 33) years old.

The main panel of questions in radiation anxiety rating scale was aimed at determination of the attitude of residents to environmental pollution in the Kropyvnytskyi city and their awareness about its adverse effects on health. The answer options had four gradations and were evaluated on a proper four-point scale – from complete denial of the proposed statement («no, it's not true», 1 point) to complete agreement with it («quite true», 4 points).

Statistical treatment of study materials was carried out using STATISTICA v.6.1 software (serial number AGAR909E415822FA). Taking into account the rule of quantitative characteristic distribution in different groups (the assessment as per Lilliefors-corrected Kolmogorov-Smirnov test), the proper parametric or non-parametric parameters and methods were used for description and analysis of this quantitative characteristics. For a normal distribution, the arithmetic mean (M), standard deviation (SD), Student's t-test for independent samples were used. For other samples the median (Me) with quartiles (LQ; HQ), prevalence (P) and prevalence error (pm), 95 % confidence interval (CI) and Mann-Whitney test (U) were used. The Bonferroni correction was suitable for multiple comparisons of several groups [1]. The relative parameters were compared by Pearson's chi-square test ($\chi 2$). The correlation between criterions was assessed using Spearman's rank correlation coefficient (rS). The critical level of statistical significance (p) when testing all hypotheses was assumed as < 0.05.

RESULTS AND DISCUSSION

The obtained responses (table 1) show that respondents, regardless of gender and age, are concerned about radiation pollution in the city. Thus, 146 (45.0 %; 95 % CI 39.6-50.5) respondents considered the territory of Kropyvnytskyi to be radiation-polluted (answers «quite true» or «true»). Almost half of the respondents are sure in the some radiation pollution of water (44.8 %; 95 % CI 41.8-47.7), air (48.5 %; 95 % CI 41.9-45.6) and soil (48, 8 %; 95 % CI 45.9-51.8). At the same time, only a third of respondents gave affirmative answers regarding food pollution – 108 (33.4 %; 95 % CI 31.3-35.5), mainly associating this with considerable levels of environmental pollution, in particular: water (r_s =0.730, p<0.001), soil (r_s =0.652, p<0.001) and air (r_s =0.655, p<0.001).

An analysis of the opinions of respondents of different ages and genders regarding environmental radiation pollution in the city revealed certain discrepancies. Namely, women more often than men emphasized radiation pollution of water (51.5±3.8 % vs. 37.4±3.9 %, p=0.011), foodstuffs (38.5±3.7 % vs. 27.8 ±3.6 %, p=0.041), air (55.0±3.8 % vs. 41.3±3.9 %, p=0.013) and soil (54.4±3.8 % vs. 42.6 ±4.0 %, p=0.033). At the same time, there were no statistically significant differences between respondents' answers depending on their ages (p>0.05).

Table 1

Assessment of environmental radiation pollution by respondents in Kropyvnytskyi (abs., %)

Urban radiation pollution	Answer options (n=324)			
	No	Probably true	True	Quite true
Territory	54 (16.7 %)	124 (38.3 %)	96 (29.6 %)	50 (15.4 %)
Foodstuffs	52 (16.0 %)	164 (50.6 %)	80 (24.7 %)	28 (8.7 %)
Water	40 (12.3 %)	139 (42.9 %)	110 (34.0 %)	35 (10.8 %)
Air	36 (11.1 %)	131 (40.4 %)	104 (32.1 %)	53 (16.4 %)
Soil	33 (10.2 %)	133 (41.0 %)	111 (34.3 %)	47 (14.5 %)

One hundred and thirty-seven (42.3 %; 95 % CI 40.4-44.2) respondents gave an affirmative answer to the question «Have cancer diseases (leukemia, cancer) occurred in your family?», 35 (10.8 %; 95 % CI 7.9-13.7) gave not quite sure answers, and almost half of the respondents, 152 (46.9 %; 95 % CI 43.8-50.0), – gave a negative answer. Family cancer cases were more often reported by the persons over 40 years – 64.0±6.8 % versus 38.3±2.9 % ($p<0.001$). Under results of the correlation analysis, the following cases were reliably associated with respondents' opinions about environmental radiation pollution in the region: with territory pollution as whole (r_S =0.160, p=0.004), water (r_S =0.310, $p<0.001$), air (r_S =0.316, $p<0.001$), soil (r_S =0.302, $p<0.001$), foodstuffs (r_S =0.194, $p<0.001$).

Regardless of the answer to the previous question, every fourth respondent (84 persons – 25.9 %; 95 % CI 22.8-29.0) considers direct relationship between cancer cases in the family and radiation exposure; the same amount of respondents (90-27.8 %; 95 % CI 24.8-30.7) reported the possibility of such exposure, other respondents (150-46.3 %; 95 % CI 44.4-48.2) don't think so. However, there is a reliable direct relationship with medium strength between respondent opinions regarding the radiation exposition and actual cases of oncology in the family (по =0.506, $p<0.001$). In particular, emphasize the relationship of oncology diseases with ionizing radiation (answers «quite true» or «true») only 11.9±2.6 % of respondents with complete negation cancer cases in families (fig. 1), while among persons who reported a cancer cases, such opinions have 69.3±3.9 % ($p<0.001$) of respondents (r_S =0.022, p=0.688 and r_S =0.094, p=0.090, respectively).

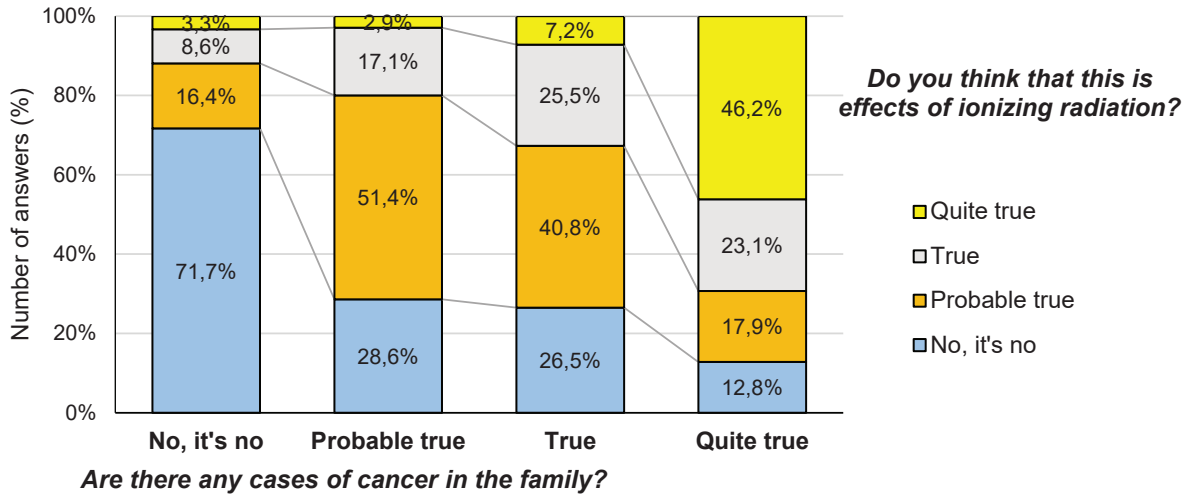

Figure 1. The distribution of respondents' answers regarding the relationship between family history of cancer and exposition to ionizing radiation

A direct correlation with medium strength was determined between respondents' confidence in the detrimental effects of the uranium mine on the health of citizens and environmental pollution: water (r_S =0.477, $p<0.001$), air (r_S =0.480, $p<0.001$), soil (r_S =0.517, $p<0.001$), foodstuffs (r_S =0.452, $p<0.001$), as well as on cancer disease causing (r_S =0.530, $p<0.001$). One hundred and thirty seven (42.3 %) respondents are convinced of this, another 121 (37.3 %; 95 % CI 35.4-39.2) are not quite convinced.

At the same time, the analysis of respondents' opinions regarding the construction of new NPP power units in Ukraine and their safety for the environment showed a somewhat another situation: only 21.9 % (95 % CI 18.8-25.0) of respondents have a negative attitude to increasing NPP power, approximately as many same (23.8 %; 95 % CI 20.8-26.7) are convinced of the detrimental effect of nuclear power plants on the environment.

Based on the survey results, the respondents' levels of radiation anxiety in score points were calculated and the total sample was classified into groups with no, low, medium, and high level of radiation anxiety (table 2).

Table 2

Distribution of respondents by level of radiation anxiety

Radiation anxiety	Score	Respondent quantity (n)	
		Absolute	P% (95 % ДІ)
No	9-15	29	8.9 (5.8-12.0)
Low	16-22	132	41.4 (39.3-43.5)
Medium	23-29	113	34.9 (31.8-38.0)
High	30-36	48	14.8 (11.8-17.7)
Mean, points	M (SD) – 22.9 (5.8), Me (LQ; HQ) – 22.0 (19.0; 27.5)		

It was established that more than a third of respondents – 34.9 % (95 % CI 31.8-38.0), have radiation anxiety, that corresponds to the medium level. Specifically, these are persons, who are concerned about radiation pollution of the residential area, food, water, air, and soil, but does not consider the operation of nuclear power plants harmful and can support their construction.

A high level of radiation anxiety, which is characterized not only by a person's concern about radiation pollution of the environment and foodstuffs, but also by confidence in the NPP danger, was observed in 14.8 % (95 % CI 11.8-17.7) of respondents.

A low level of radiation anxiety was determined in 41.4 % (95 % CI 39.3-43.5) of respondents. These people are not worried about the effects of radiation on their health, do not consider the operation of nuclear power plants harmful, support their construction, but recognize the possibility of radiation pollution on the residential territory, foodstuffs, water, air, and soil. Overall, the average severity of radiation anxiety among participants was M(SD) = 22.9 (5.8) points, which corresponded to the upper limit of the low level interval.

In 8.9 % (95 % CI 5.8-12.0) of cases, the sum of points was lower than the level of radiation anxiety presence (9-15 points). This are people who are not concerned about the effects of radiation on their health, do not consider their residential territory to be radiation-dangerous, do not see any harm in the operation of nuclear power plants, and support the construction of new power units. It should also be noted the absence of significant differences between indices of radiation anxiety in respondents of different genders and ages.

To find out dynamic changes in the structure, including level and prevalence of radiation anxiety states in the population, we used the results of a similar our study in the Kropyvnytskyi city (formerly Kirovohrad) in 2014 (table 3). At that time, only 3.9 % (95 % CI 0.3-8.1) of respondents had a high level of radiation anxiety, characterized not only by concern about radiation pollution of the environment and foodstuffs, but also by confidence in the danger of nuclear power plants. In another quarter of respondents (27.6 %; 95 % CI 24.1-31.1) radiation anxiety reached a medium level, specifically, concern about radiation pollution of the residential territory, foodstuffs, water, air, soil, support for the future construction of the NPP and not notice the damage from NPP operation. In 16.0 % (95 % CI 10.7-21.3) of cases, the sum of points was lower than level of radiation anxiety presence [9]. The obtained results show an essential increase in the levels of medium and high radiation anxiety among residents of Kropyvnytskyi over a 5-year period.

Table 3

Comparative characteristics of the radiation anxiety level among residents of Kropyvnytskyi for different years

Radiation anxiety	Point score	P % (95 % CI)	
		2014	2019
No	9-15	16.0 (10.7-21.3)	8.9 (5.8-12.0)
Low	16-22	52.5 (49.3-55.7)	41.4 (39.3-43.5)
Medium	23-29	27.6 (24.1-31.1)	34.9 (31.8-38.0)*
High	30-36	3.9 (–0.3-8.1)	14.8 (11.8-17.7)*

Note: * differences in indices $p<0.05$

In 2016, the complex measures to prevent radiation anxiety states were offered to the authorities of Kropyvnytskyi city [9]. However, results of the latest (2019) study may indicate an insufficient implementation of such measures in the city.

In our studies, respondents' suspicious attitude towards radiation exposure was revealed. Same results were also obtained in other studies. In particular, the authors from the Palermo University surveyed of 343 patients who had to undergo X-ray examination, MRI, and CT. Eighty-three of 343 patients were excluded due to non-completion of the questionnaire. Thirty-one percent of female patients underwent MRI, 18 % breast imaging, 10 % X-ray, 22 % computed tomography, and 19 % ultrasound. Forty-one percent of patients applied for the examination due to oncological diseases, and 59 % – due to non-oncological diseases. A high level of anxiety was present in the majority

(approximately 91 %) of patients. Anxiety level was higher in non-oncology patients (54 %) and in patients awaiting MRI (29 %) [6, 8].

Mental outcomes such as depression, anxiety and post-traumatic stress disorder (PTSD) are highly prevalent in the population affected by a radiation disaster. Swedish scientists investigated the effects of the Fukushima nuclear accident on mental health. After a nuclear disaster, the most common mental health disorders are PTSD, anxiety and depression. PTSD is characterized by severe anxiety and high levels of stress, the most marked symptoms are hypervigilance, unusual behavior, and re-experiencing the trauma, such as flashbacks or nightmares. These authors found PTSD in 14-59 % of evacuees in the first year after the Fukushima nuclear accident. The results of the Mental Health and Lifestyle Survey (MHLS) (Fukushima Medical University) among people from evacuated areas should also be mentioned. This study found that the likely prevalence of depression among adult evacuees was 14.6 % in 2012 and slowly declined to 9.7 % in 2014, but was significantly higher than the average in Japanese, i.e. approximately 3 % of respondents. The surveyed depressive states indicate the need for further activities on educational measures to elucidation the real danger of NPP accident [7]. The discrepancies between these results and our studies of the radiation anxiety level dynamics can be explained by the nonrecurrent nature of the Fukushima nuclear incident, which interpreted by the population as a «disaster in the past», in contrast to the permanent threat from the operating nuclear fuel cycle facilities in Ukraine [5].

In our work, the insufficient information awareness of the population regarding the radiation pollution of the territory, water, and foodstuffs was revealed. The spread of gossip and the most incredible rumors had a negative effect on the radiation anxiety status. Similar studies of Japanese scientists was aimed to investigate the relationship between receiving radiation information from media and radiation anxiety among Fukushima residents 5.5 years after the nuclear power plant accident. Between August and October 2016, two thousand randomly selected residents of Fukushima Prefecture were surveyed. Seven hundred and ninety (39.5 %) residents gave reliable answers. The obtained results showed that radiation anxiety can be increased not by receiving information from media, but by interpersonal communication and unidirectional information exchange [4, 10].

The obtained results encourage the authors to future research for finding out correlations and the effects of larger-scale social shocks – in particular, prolonged military aggression and accompanying social troubles on the structure of «traditional» anxiety states of the population in the territories with nuclear fuel cycle facilities.

CONCLUSIONS

1. It was shown that, along with the well-known ecological consequences of the operation of nuclear fuel cycle companies, including the formation and spread of steady radioactive pollution of the environmental facilities, in residents of cities with nuclear fuel cycle companies develop and maintain a specific psycho-emotional state – radiation anxiety, which is manifested by a complex of neuromental and somato-physiological disorders against the fear of ionizing radiation sources background. However, this psychogenic effect may not be associated with the degree of real health consequences of ionizing radiation.

2. Developing and maintaining at a certain level of specific anxiety states among the population, including radiation anxiety, usually occurs against the background of even relatively stable military and socio-economic situation in the country. It was determined, that in 2019, before the COVID-19 pandemic and the full military aggression of Russia against Ukraine, more than 90 % of the surveyed Kropyvnytskyi residents, regardless of gender and age, were concerned about possible radiation pollution of the environment and foodstuffs; 34.9 % had medium level of radiation anxiety, 14.8 % – high. Low radiation anxiety was detected in 41.4 % of respondents, and in 8.9 % it was absent.

3. It is shown that within 5 years (2014-2019) there have been noticeable negative structural changes in the radiation anxiety states of the surveyed urban residents, in particular: the amount of people without signs of radiation anxiety has halved (8.9 % vs. 16.0 %) and nearly quadrupled the number of respondents with a high level of this psycho-emotional state (14.8 % versus 3.9 %).

Perspectives of further research. The obtained results encourage the authors to continue the studying of specific radiation anxiety states of the population to find out the dynamics of their qualitative and quantitative characteristics against the background of more vigorous and dangerous consequences of specific and social disasters, and also taking into account that in Ukraine the main factor of radiation anxiety remains actual today – the activity of nuclear fuel cycle companies.

FUNDING AND CONFLICT OF INTEREST

The authors declare no conflict of interest. The research has no external sources of funding.

COMPLIANCE WITH ETHICAL REQUIREMENTS

The authors confirm that the sociological survey (questioning) for the article preparation was conducted in compliance with the bioethical principles outlined in the Helsinki Declaration «Ethical principles for medical research involving human subjects». The Commission on Biomedical Ethics of the Dnipro State Medical University concluded that this work complies with generally accepted rules of morality, the requirements for observing the rights, interests and personal dignity of study participants.

REFERENCES

1. Antomonov, M. Yu. (2018). Matematychna laboratoriya ta analiz medyko-biolohichnykh danykh. 2-nd ed. Kiev: Medinform. [in Ukrainian]
2. Deforzh, H., Dorohan, S., & Kovalenko, P. (2021). Radioaktyvne vyprominiuvannia: vplyv na zdorovia liudyny nyzkointensyvnoi postiinoi pryrodnoi radiatsii v Ukraini ta sviti. Dubrovina, N., & Filip, S (Eds). National Health as Determinant of Sustainable Development of Society (pp. 131-154). Bratislava: School of Economics and Management in Public Administration in Bratislava [in Ukrainian]
3. Dorohan, S. B., Shevchenko, A. A., Kulagin, A. A., Liashchenko, O. V., Lobas, V. M., Mikriukova, N. G., & Kostetsky, I. V. (2022). Perception of the epidemic risks of the COVID-19 pandemic by the population of Ukraine. Medicni Perspektivi, 27(3), 142-149. doi: 10.26641/2307-0404.2022.3.265962.
4. Fukasawa, M., Kawakami, N., Nakayama, C., & Yasumura, S. (2021). Relationship between use of media and radiation anxiety among the residents of Fukushima 5.5 years after the nuclear power plant accident. Disaster Medicine and Public Health Preparedness, 15(1), 42-49. 9. doi: 10.1017/dmp.2019.132.
5. Hillgard, S. H. (2020). Combat stress disorders and the U. S. Military Medicine, 155(11), 515-519.
6. Kim, T. K. (2015). T test as a parametric statistic. Korean journal of anesthesiology, 68(6), 540-546. doi: 10.4097/kjae.2015.68.6.540.
7. Lindberg, M. L., Hedman, C., Lindberg, K., Valentin, J., & Stenke, L. (2022). Mental health and psychosocial consequences linked to radiation emergencies – increasingly recognised concerns. Journal of Radiological Protection. 42(3). doi: 10.1088/1361-6498/ac7d19.
8. Lo Re, G., De Luca, R., Muscarneri, F., Dorangricchia, P., Picone, D., Vernuccio, F., ... & Cicero, G. (2016). Relationship between anxiety level and radiological investigation. Comparison among different diagnostic imaging exams in a prospective single-center study. La radiologia medica, 121, 763-768. doi: 10.1007/s11547-016-0664-z.
9. Shevchenko, O. A., & Dorohan′, S. B. (2020). Radiotryvozhnist′ naselennya: Ryha: LAP LAMBTPT Academic Publishing. [in Ukrainian]
10. Shevchenko, O. A., Burlakova, I. A., Sheviakov, O. V., Agarkov, O. A., & Shramko, I. A. (2020). Psychological bases of occupational health of specialists of economic sphere. Medicni Perspektivi, 25(2), 163-167. https://doi.org/10.26641/2307-0404.2020.2.206890.

Резюме

АНАЛІЗ СТРУКТУРИ РАДІОТРИВОЖНИХ СТАНІВ НАСЕЛЕННЯ В ДОКОВІДНИЙ ПЕРІОД

Сергій Б. Дорогань[2], Олександр А. Шевченко[1], Валерія М. Лехан[1], Олексій В. Шевяков[4], Надія І. Оперчук[3], Наталя Г. Мікрюкова[2], Олексій М. Чередніченко[5]

1 – Дніпровський державний медичний університет, м. Дніпро, Україна
2 – Донецький національний медичний університет, м. Кропивницький, Україна
3 – Державна установа «Кіровоградський обласний центр контролю та профілактики хвороб МОЗ України», м. Кропивницький, Україна
4 – Український державний університет науки і технологій, м. Дніпро, Україна
5 – Хортицька національна навчально-реабілітаційна академія, м. Запоріжжя, Україна

Вступ. Значний обсяг суперечливих повідомлень створює умови для занепокоєння щодо впливу радіації на здоров'я. Адекватність оцінки проблем та відповідей на ці виклики залежить від джерел, якими користується людина, її культури і освіти, а також емоційного забарвлення цієї оцінки.
Мета – на підставі психолого-гігієнічної оцінки визначити динамічні зміни поширеності та структури радіотривожних станів населення за сталих соціальних умов.
Матеріали та методи. Для вивчення і оцінки сприйняття жителями м. Кропивницький рівня і поширеності радіотривожних станів було проведено опитування в соціальних мережах з лютого по грудень 2019 року з використанням Google Form. Для оцінки динамічних змін радіотривожності використовували дані власних досліджень, проведених у 2014 році. Методика анкетування базувалась на засадах раніше випробуваної і запатентованої «Методики визначення радіотривожності населення» та монографії «Радіотривожність населення». У дослідженні взяли участь 324 жителів м. Кропивницький віком від 18 до 73 років, з них чоловіків – 155 (47,8 %), жінок – 169 (52,2 %). Середній вік опитаних (Me (LQ; HQ)) – 27 (20; 33) років.
Результати. У мешканців міст з об'єктами ЯПЦ формується та підтримується на тому чи іншому рівні специфічний психоемоційний стан – радіотривожність, що проявляється комплексом нервово-психічних і сомато-фізіологічних розладів на тлі боязні джерел іонізуючої радіації. Разом з цим, такий психогенний ефект може бути не пов'язаний зі ступенем реального впливу іонізуючого випромінювання на здоров'я людини. Визначено, що станом на 2019 рік, до поширення пандемії COVID-19 та повномасштабної збройної агресії росії проти України, понад 90 % опитаних мешканців м. Кропивницький, незалежно від статі та віку, стурбовано ставились до можливого радіаційного забруднення довкілля і продуктів харчування, 34,9 % мали середній рівень радіотривожності, 14,8 % – високий. Низька радіотривожність виявлена в 41,4 % респондентів, а в 8,9 % – відсутня.
Висновки. Протягом 5 років (з 2014 до 2019) відбулись помітні негативні зміни у структурі радіотривожних станів опитаних мешканців міста, зокрема: удвічі зменшилась кількість осіб без ознак радіотривожності (8,9 % проти 16,0 %) та майже вчетверо побільшало респондентів з високим рівнем цього психоемоційного стану (14,8 % проти 3,9 %). Отримані результати спонукають авторів продовжити дослідження специфічних радіотривожних станів населення з метою з'ясування їх динаміки.

Ключові слова: **радіотривожність, депресія, тривожність, видобування урану, уранові шахти, підприємства ядерно-паливного циклу**