Yaroshenko Zh. The incidence of non-tumour diseases of the respiratory organs of offspring of the first generation of residents of radiation-contaminated territories of Ukraine under the age of 18 years. Journal of Education, Health and Sport. 2019;9(12):264-274. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2019.09.12.027 http://dx.doi.org/10.12775/JEHS.2019.09.12.027 http://dx.doi.org/10.12775/JEHS.2019.09.12.027

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Received: 16.12.2019. Revised: 23.12.2019. Accepted: 28.12.2019.

UDC 616.2-03-053.2/.7:614.876(477)

The incidence of non-tumour diseases of the respiratory organs of offspring of the first generation of residents of radiation-contaminated territories of Ukraine under the age of 18 years

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Abstract

There was conducted an epidemiological study of the morbidity of non-tumour diseases of the respiratory organs of the first-generation offspring born by residents of radioactively contaminated territories, until they reached 18 years. The observation period from 1987 to 2016. The total cohort was 35893 individuals, among whom male offspring constituted 18138 individuals, while female offspring constituted 17755 individuals. There were created 4 groups to study offspring up to 3 years old, depending on the time of birth of offspring after an accident – years of birth:(first – 01.03.1987– 28.02.1990, second – 01.03.1990– 28.02.1993, third – 01.03.1993– 28.02.1996, fourth – 01.03.1996– 28.02.1999), with a three-year observation period.

During the observation period, there were detected 7845 cases of non-tumour respiratory diseases, which is 36.6% of the total pathology and 59,59±0,65 cases by 103 man-

years observations. Of whom male offspring 4146 cases (C -38,8%, ID $-62,42\pm0,94$ by 103 man-years), and female offspring -3699 (C -34,6%, ID $-56,72\pm0,91$).

The formation of non-tumour respiratory diseases occurred mainly due to the groups of diseases: "acute respiratory infections of the upper respiratory tract" (J00-J06.9) and "influenza and pneumonia" (J10-J18.9), "other upper respiratory tract diseases (J30.0-J39.9)" and "other acute respiratory infections of the lower respiratory tract (J20- J22), which amounted to 98.84%.

For all the years of observation among the studied groups, the highest rates of respiratory disease in each period on the first or second, and the lowest - on the fourth.

An analysis of the incidence showed that up to 6 years, offspring were mainly affected by acute respiratory infections of the upper respiratory tract and chronic tonsillitis and adenoids, and in the younger school-age, the incidence increased due to acute upper and lower respiratory tract diseases. In adolescence, the morbidity of the respiratory system is complicated by more severe nosological forms: chronic obstructive pulmonary disease, asthma.

Keys words: First-generation offspring; radioactively contaminated territories; diseases of the respiratory organs.

Introduction. The radiological consequences of the Chornobyl catastrophe have recently begun to be revised. Researchers in many countries around the world are debating the impact of low doses of ionizing radiation on human health. [5]. Scientists such as scientists V. Bebeshko, E. Stepanova, O. Savyshko, O. Kopylov have proved that one of the most adverse consequences of the Chernobyl accident is the deterioration of the health of the affected population, especially children. Children born to exposed parents have high rates of morbidity, early infant mortality [1, 3].

According to the results of the annual dispensation of the affected contingents, as of 01.01.2016, 457 676 are registered in the State Register of Ukraine (SRU), the descendants of the victims due to the Chernobyl accident, of which about

70% reside at RCT. The effect of low doses of radiation in the mechanism of development of medical effects in the post-emergency period is associated with a time factor. Increasing the duration of radiation exposure at the same total dose causes a corresponding increase in the negative reactions of the body. With the time factor and the influence of small doses, maladaptation occurs with further depletion of the body and deterioration of health [6, 7].

The aim of the study. Epidemiological analysis of the incidence of non-tumour diseases of the respiratory organs of the descendants of the first generation of victims of the Chernobyl accident during the period from 1987 to 2016.

Material and methods of research. To study the health status of first-generation offspring (FGO), a cohort of RCT residents born from 01.03.1987 to 28.02.1999, with an age of 18 years, of 35893 people, of which 18138 were male offspring (MOI)and 17755- women's (FOI) articles. The cohort includes residents of settlements of Zhytomyr, Kyiv, Chernihiv, Rivne regions, respectively Ovruch, Ivankiv, Kozelets, Rokytne districts. The database of the SRU database was used as the information base of the annual medical dispensary for residents living on RCT for the period from 1988 to 2016.

Based on the total cohort, taking into account the Quinn age periodization, 4 study groups of offspring up to 3 years old were formed, depending on their birth time after the accident over six three-year observation periods of 18 years. Birthdays taken as the basis for the formation of groups: first - 01.03.1987- 28.02.1990, second - 01.03.1990 - 28.02.1993, third - 01.03.1993 - 28.02.1996, fourth - 01.03 .1996- 28.02.1999.

A clinical and epidemiological study of the state of health of FGO was conducted from birth to the age of 18. The morbidity was assessed according to the groups of nosological forms of the class "Respiratory diseases", according to ICD-10. Indicators were structure (C) and morbidity (ID) levels [2, 4]. Trends in the incidence of respiratory diseases were investigated to determine the direction of the vector of further development of the pathology.

Results of the research. As a result of an epidemiological study of the offspring of the first-generation offspring born in families permanently residing on FGO at the age of 18, 7845 cases of non-neoplastic respiratory diseases were identified, accounting for 36.68% of the total pathology and 59.59 ± 0.65 cases for 103 people-years. observation. 4146 diseases were diagnosed in the MOI (C -38.8%, ID-62.42 ± 0.94 per 103 person-years), in the FOI - 3699 (C - 34.6%, ID-56.72 ± 0, 91).

The study of the structure of respiratory organ pathology in FGO RCT up to 18 years in 1987-2016 showed that the formation of non-tumour respiratory diseases occurred mainly due to the groups of diseases: "acute respiratory infections of the upper respiratory tract(VRI) (J00-J06.9) and influenza and pneumonia (J10-J18.9)), "other upper respiratory tract diseases (J30.0-J39.9)" and "other acute respiratory infections of the lower respiratory tract (J20- J22), which amounted to 98.84% (figure 1).



Fig. 1 - Structure of the incidence of non-tumour respiratory disease in FGO of RCT residents under 18 years of age for the years 1987-2016 for epidemiological surveillance

The rest are chronic lower respiratory tract diseases (J40.0-47.9), namely: chronic bronchitis, other chronic obstructive pulmonary diseases, asthma, accounting for up to 1.16%.

The structure of the incidence of non-tumour diseases of the respiratory organs, depending on the sex of the subjects are presented in Figure 2.



Fig. 2 - Structure of the incidence of non-neoplastic respiratory disease in FGO of RCT residents under the age of 18 years by gender affiliation for the years 1987-2016 epidemiological surveillance

The structure of respiratory pathology among the MOI and FOI in the proportion of nosological groups is consistent with the structure of the investigated as a whole. However, the offspring of males for each group of diseases get sick more often.

Respiratory morbidity in all study groups was mainly due to the groups: "acute respiratory tract upper respiratory infection", "influenza and pneumonia", "other upper respiratory tract diseases" and "other acute respiratory tract infections". The primary manifestation in the group "acute upper respiratory tract diseases" in acute nasopharyngitis, sinusitis, pharyngitis, tonsillitis, and others; in the group "other diseases of the upper respiratory tract" - for chronic diseases of the tonsils and adenoids, "other acute respiratory infections of the lower respiratory tract" - acute bronchitis and bronchiolitis.

The rates of morbidity of respiratory organs of offspring of the first generation for 18 years of life, depending on the time of birth after the Chernobyl accident, are given in Table 1.

Table 1- Morbidity rates of respiratory diseases of offspring of the first generation of the four study groups over the 18 years of life, ID $\pm m$.

Observation	Observed of the first-generation offspring											
periods												
Years of life	First			Second			Third			Fourth		
First/0-3	27,52	±	15,67	82,35	\pm	29,81*	25,32	±	17,67-	24,69	±	8,62-
Second/4-6	66,31	±	12,82	58,55	±	9,21*	31,23	±	4,68*-	25,09	±	2,07*-+
Third/7-9	58,37	±	7,25	65,68	±	4,50*	58,93	±	2,73	34,58	±	1,96*-+
Forth/10-12	76,38	±	4,09	79,04	±	2,83	52,59	±	2,22*-	34,02	±	1,95*-+
Fifth/13-15	96,00	±	2,88	71,42	±	2,37*	53,62	±	2,12*-	48,69	±	3,15*-
Sixth/16-18	82,30	±	2,78	69,21	±	2,46*	67,96	±	3,45*	20,58	±	1,70*-+

Notes: * - Authentic difference between the first and other groups,

- - Authentic difference between the second and other groups,

+ - Authentic difference between the third and other groups

At the first other levels of life, the FGO has the highest level of disease activity research, which is continually changing in the second study group. Levels are advisable to use other groups that are also indistinguishable. At 4-6 years of age, extension by the level of excellence increases in the middle group, with the highest ability to show in their study groups and the lowest in the fourth. In 7-9 years, the most diverse middle-aged workers studied groups in comparison to others. High confidence in the first and third groups with no significant difference, the lowest - for the fourth. For 10-12 years, life was found in the first and second groups without reliable decisions. For the third and fourth, he made a difference in equal units and these groups. At the age of 13-15 years, the group with the most trusted level in the second, third, and fourth groups was first examined. In 16 - 1 8 years - will find morbidity in their studies, which are in the group, standing in the second and third, the lowest - in the fourth.

Thus, for all the years of observation among the studied groups, the highest rates of respiratory disease in each period on the first or second, and the lowest - on the fourth

According to the results of the work, it was found that in the first observation period (0-3 years), the average showed a diagnosis group, which revealed acute diseases with the upper respiratory tract with almost the same levels. The middle descendants of the first and the second groups also record chronic diseases of the tonsils and adenoids, which outgrow the level of other disease groups. Participants in the third study group, 0-3 years old, also examined acute bronchitis and bronchiolitis.

In other periodic preservation (4-6 years) in the first research groups, group groups containing chronic diseases of the tonsils and adenoids are examined, and in other children, this pathology is halved. The question of a classically ill person breathing in this age period of the middle in the third and fourth groups almost did not change.

In the third period (7 - 9 years), there is a high possibility of acute diseases of the upper respiratory tract of the middle progeny that were studied in the group and of acute diseases of the lower respiratory tract of the middle and third groups.

In fourth and fifth periods (10-15 years), the average study population examined a group that appeared to be insignificant, but equality was essential for those with acute illness.

In the sixth period (16-18 years), the question of human respiratory ill FOI reached a high average FGO of the first, second and third groups, mainly for offspring with acute respiratory tract diseases, at the same time in fourth examining groups - significantly reduced as a result of often showing acute upper respiratory tract diseases.

The development of reliability on the painful surface of breathing in the descendants of the four studied groups is sent in Figures 3-6. By providing a discussion of the reliability of the first study groups for the pathological organization of breathing in the dynamics of endof-life, it manifests itself during the first years of life and reaches maximum levels by 13-15 years of life (Fig. 3).

At the age of 0-3 years, 7-12 and 16-18 years, the MOI are more likely to be ill than the MOI, in other periods of life no significant difference in levels was observed.

The morbidity in this group from birth to 10-12 years of life was formed generally due to "acute respiratory infections of the upper respiratory tract" and "other diseases of the upper respiratory tract", namely chronic diseases of the tonsils and adenoids. From 7-9 years, offspring begin to have influenza and pneumonia, "other acute respiratory infections of the lower respiratory tract" (acute bronchitis, bronchiolitis), chronic diseases of the lower

respiratory tract (bronchitis), from 10-12 years - obstructive pulmonary diseases, from 13 -15 years - asthma.



Figure 3 - Dynamics of morbidity of respiratory diseases of offspring of the first study group for 18 years of life

During the period of life - 13 -18 years, the highest frequency of manifestation of acute respiratory diseases of the upper respiratory tract (VRI). The dynamics of respiratory diseases in the offspring of males and females form the dynamics of the development of these diseases of the first group as a whole. The study of the trend of respiratory disease in the offspring of the first group indicates the growth of this pathology in the following years of life.

The dynamics of respiratory diseases in the offspring of the second study group differs depending on gender, namely, in the MOI the highest levels are at the age of 0-3 years, with a gradual decrease in the subsequent periods of observation with the minimum levels at the age of 16-18 years (Fig. 4).



Figure 4- Dynamics of morbidity of respiratory diseases of offspring of the second study group for 18 years of life

In the FOI - the lowest levels in the first years of life, with a gradual increase in levels throughout the observation period with a maximum value of 10-12 years. The difference in the levels of morbidity by respiratory diseases according to sex is only up to 10-12 years of life, where the higher levels are in the MOI.

In the second study group, morbidity up to 7-9 years is mainly due to "acute respiratory infections of the upper respiratory tract" and "other diseases of the upper respiratory tract," namely chronic diseases of the tonsils and adenoids and others. Influenza and pneumonia, "other acute respiratory infections of the lower respiratory tract" (acute bronchitis, bronchiolitis), chronic diseases of the lower respiratory tract (bronchitis) were recorded from 4-6 years in the FOI, and 7-9 years in the FOI with small values of the indicator. From 10-12 to 18 years, the offspring of both sexes were most often ill with VRI. The dynamics of respiratory diseases in male and female offspring shape the dynamics of the development of these diseases of the second group as a whole. The tendency of the development of respiratory diseases in the descendants of the second group does not indicate any unusual changes in the future.

The development of diseases of the respiratory diseases of the offspring of the third study group has the same nature of changes, ranging from the lowest levels at the age of 4-6 years to the highest when they reach 16-18 years (Fig. 5).



Figure 5 - Dynamics of respiratory disease incidence of offspring of the third study group for 18 years of life

However, in the first three years of life, the disease, namely "other acute respiratory infections of the lower respiratory tract" (acute bronchitis, bronchiolitis), was diagnosed only in the MOI.

In the first years of life, among the offspring of the third study group, the boys suffered from VRI and "other acute respiratory infections of the lower respiratory tract" (acute bronchitis, bronchiolitis). From 4 to 18 years of age the incidence of offspring of both sexes was mainly due to "other upper respiratory tract diseases" (chronic tonsillectomy and adenoids) and "VRI," and a minor manifestation of influenza and pneumonia, acute bronchitis, bronchiolitis, chronic respiratory tract diseases bronchitis, obstructive pulmonary disease, asthma). According to the study, third-group MOI are more often than FOI throughout the observation period. The dynamics of respiratory diseases in male and female offspring shape the dynamics of the development of these diseases in the third group as a whole. The established trend of the trend of morbidity for respiratory diseases in the offspring of the third group indicates the growth of this pathology in the future.

Respiratory morbidity among the offspring of the fourth study group had a uniquely directed developmental dynamics from the lower levels in the first three years of life to the highest in 13-15 years of life with a sharp decline in 16-18 years (Fig. 6).





A significant difference in the levels between offspring by sex is seen in 10 - 12 years when higher levels are registered in the MOI compared to the FOI.

In the descendants of both genders of the fourth study group in the first years of life, the pathology of the respiratory system manifests VRI and "other diseases of the upper respiratory tract" (diseases of the tonsils and adenoids), which mainly form the morbidity within 18 years of observation. Among MOI up to 3 years old, were also reported "other acute respiratory infections of the lower respiratory tract" (acute bronchitis, bronchiolitis). From 4-6 years, the descendants of both sexes are more likely to suffer from acute bronchitis, bronchiolitis, and more rarely "flu and pneumonia," chronic diseases of the lower respiratory tract (bronchitis, obstructive pulmonary diseases, asthma). The dynamics of respiratory

diseases in the offspring of males and females form the dynamics of the development of these diseases of the fourth group as a whole. The tendency of the development of respiratory diseases in the offspring of the fourth group has a slight increase in the following years of life.

Conclusion. Based on the above, it can be noted that the descendants of the first study group born in the first four years after the Chernobyl accident have a higher incidence of respiratory diseases relative to the descendants of the second, third and fourth groups born after seven, ten, three, three years. With offspring births after the accident, the incidence rate is significantly reduced, with the lowest value in the fourth group. The dynamics of the development of this pathology from birth to the 18th anniversary of FGO are characterized by an increase in each subsequent three-year follow-up period in the first, third and fourth groups, in the second - almost unchanged. Health loss was mainly due to three groups of diseases: "acute upper respiratory tract diseases", "other upper respiratory tract diseases", "other acute respiratory infections of the lower respiratory tract". An analysis of the incidence over the three-year follow-up period showed that up to 6 years, offspring were mainly affected by VRI and chronic tonsillitis and adenoids, and in the younger school-age, the incidence increased due to acute upper and lower respiratory tract diseases. In adolescence, the morbidity of the respiratory system is complicated by more severe nosological forms: chronic obstructive pulmonary disease, asthma.

The tendency for an increase in the incidence of respiratory diseases is observed among the offspring of the first, third, and fourth groups. In contrast, the offspring of the second - the trend does not indicate any unusual changes in the future.

To prevent the loss of health of offspring living on respiratory tract diseases, it is necessary to carry out medical and social activities:

- examination of the bronchopulmonary system with the study of the function of external respiration (spirography) to all children after six years once every two years;

- carrying out of allergic tests to children with provoked heredity, after suffering repeated bronchitis, pneumonia, a manifestation of allergy with further carrying out, if necessary, preventive medical measures.

Determination of the incidence of non-tumour respiratory diseases in the firstgeneration offspring under 18 years of age living in radiation-contaminated territories in terms of structure and dynamics, revealed priority nosological forms. This is the rationale for improving medical and social interventions to preserve and prevent the loss of offspring health.

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