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**Research article**

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# Features of the prevalence of chronic cystitis among adolescents

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**Abstract.** *The present study aimed to assess the dynamics of the incidence, and prevalence of chronic cystitis in adolescents of both sexes in a comparative regional aspect in Ukraine.*

*Methods. Data from official statistics for 2013-2017 were used. Incidence and prevalence indicators are presented in a comparative aspect by sex and administrative categories of Ukraine.*

*Results. It was found that with higher rates among girls, the growth rate of morbidity and prevalence among boys is much higher.*

*Conclusions. Territorial features have been identified and those that require the primary attention of specialists to make appropriate decisions.*

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# Особливості розповсюдженості хронічного циститу серед підлітків

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**Резюме.** *Виходячи із мети роботи - оцінити динаміку захворюваності, поширеності хронічного циститу у підлітків обох статей в порівняльному регіональному аспекті до загальноукраїнських. Відповідно був використаний первинний матеріал.*

*Методи. В роботі представлений порівняльний аналіз (за 2013 – 2017 рр.) захворюваності та поширеності хронічного циститу серед підлітків обох статей в Україні на підставі даних офіційної звітності. Вивчались інтенсивні коефіцієнти в розрахунку на 10 тис. відповідного населення та абсолютні величини в розрізі п'яти регіонів країни, областей, що входять до їх складу, та м. Києва.*

*Результати. Виявлено зростання захворюваності та поширеності патології серед юнаків та дівчат при більшому темпі приросту першої (на 30% проти 8,1% до 1,3 та 4,0 на 10 тис. у 2017 р.), на тлі інтенсивного процесу серед юнаків (на 42,0% та 22,2% проти 20,0% та 6,1% відповідно) та вищих величин серед дівчат (до 2,2 та 6,9 проти 0,4 та 1,2 серед юнаків відповідно). У 2017 р. на обліку перебувало 432 підлітків з хронічним циститом, що на 7,5% менше, ніж у 2013 р., 30% з них припадало на випадки з вперше встановленим діагнозом; доля дівчат становила 84 – 86%.*

*Висновок. Доведено зростання поширеності патології в усіх регіонах, за винятком Південного та м. Києва, захворюваності – в Західному, Центральному, Південно-Східному. Виявлені області, що формують ситуацію за високими показниками та мають тенденцією до зростання, як серед юнаків так й дівчат.*

**Ключові слова:** *хронічний цистит, поширеність, захворюваність, підлітки, юнаки, дівчата.*

**Introduction.** Urinary tract infections are considered to be the most common bacterial infection worldwide [1-3]. Among the urinary system diseases in children, urinary tract infections appear most often [2, 4]. Their spread is of interest in connection with frequent recurrences and the development of complications in a form of pyelonephritis [5, 6]. As a result, this group of diseases is in the first place in the structure of nephropathy in children and is 77 – 80% of all cases of hospitalizations [2, 4]. A precondition for the development of the situation should be cystitis which takes the chronic form without proper treatment and become its starting moment [7]. That is why just chronic cystitis in children acquires medical and social significance. Its peculiarity increases in adolescents because, according to the literature, ¾ children of the older group are diagnosed with structural changes in the urinary tract on the background of aggressive course in children of early age groups that accompany common somatic diseases [2, 7]. The relevance of studying the dynamics of the epidemiological process of chronic cystitis increases if we add to the above data the fact that the birth rate in Ukraine, according to official statistics, 2013 to 2017 decreased by 15.3% (from 11.1 to 9.4 by 100 thousand people), but children aged 15 – 17 years at the same time decreased by 21.1% (from 1.3697 to 1.080.070, respectively). Information on individual administrative territories in terms of all-Ukrainian trends is important in terms of making targeted effective medical and social decisions.

In this regard, **this study aimed** of the work is to assess the dynamics of the incidence, and prevalence of chronic cystitis in adolescents of both sexes in a comparative regional aspect to the all-Ukrainian.

**Materials and Methods.** There was collected and summarized in a comparative aspect the information on the incidence and prevalence of chronic cystitis in adolescents of both sexes in Ukraine from 2013 to 2017 based on data from the State Statistics Service and official reports of medical institutions of the Ministry of Health. The maximum and minimum indicators of frequency of the specified processes on 10 thousand of the corresponding population, and also absolute values as a whole on Ukraine and its separate territories (regions, areas) were defined. In case of the need to compare the data in their context for the study period, the average values with the standard error were calculated. In the analysis of indicators, the classical approach of estimating variation series was used. The student's criterion was used to determine the difference between the two statistical populations.

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**Results.** The study of the data of the five-year analysis of intensive coefficients per 10 thousand of the relevant population (hereinafter, for convenience, their specific values are given) the prevalence and incidence of chronic cystitis (CC) in adolescents in Ukraine showed their growth, both among young people and girls. In particular, the growth rate is 3.7 times higher in the case of morbidity (30% vs. 8.1% in prevalence); in 2017, their levels were 1.3 and 4.0 against 1.0 and 3.7 for five consecutive years. This feature is inherent in persons of both sexes. Namely: the rate of increase in the incidence rate of boys twice and girls was 3.6 times higher than the prevalence (42.8% vs. 20.0% and 22.2% vs. 6.1%, respectively). As a result, in 2017 the incidence rates were 0.4 and 2.2 among boys and girls, respectively, against 0.28 and 1.8 in 2013; prevalence was 1.2 and 6.9 against 1.0 and 6.5, respectively. In addition, it is obvious that in both cases among girls the levels are significantly higher. Thus, in the case of morbidity of 5.5 times (2.2 vs. 0.4 among young men), a prevalence of 5.7 times (6.9 vs. 1.2), i.e. in the first and second cases, the overall picture in the country is formed on their scores. In addition, the data on the predominance of the rate of increase in morbidity put before the health authorities an urgent need to prevent the development of lower urinary tract infections. Although this applies more to girls, the more intensive increase in the disease among boys (by 42.8% against 22.2% of girls) also attracts attention.

To objectify the assessment of the dynamics of these processes by region, taking into account the relatively wide variability of time series, in the regions that are part of them, the average values for each with a standard error were determined (Table 1 and Table 2).

*Table 1*

**Dynamics of levels of prevalence of chronic cystitis among adolescents, taking into account gender (10 thousand people); M ± SD**

| Regions | Teens | | Boys | | Girls | |
|---|---|---|---|---|---|---|
| | 2013 | 2017 | 2013 | 2017 | 2013 | 2017 |
| Western | 2,7±0,7 | 4,4±1,4 | 0,72±0,2 | 1,2±0,2* | 4,6±1,0 | 7,8±8,9 |
| Central | 3,8±0,9 | 5,2±0,6* | 0,9±0,2 | 1,76±0,2* | 7,5±1,9 | 10,0±1,4* |
| Northeast | 4,1±0,7 | 4,8±1,1 | 1,1±0,3 | 1,1±0,5 | 6,2±1,2 | 6,8±0,5 |
| Southeast | 3,0±0,3 | 3,5±1,1 | 1,5±0,4 | 1,2±0,2 | 5,0±0,5 | 6,0±1,9 |
| Southern | 3,4±1,1 | 3,0±0,7 | 1,4±0,6 | 0,9±0,2 | 2,5±1,8 | 5,0±1,5 |
| Kyiv | 10,4 | 8,6 | 1,89 | 2,5 | 19,0 | 15,1 |
| Ukraine | 3,7 | 4,0 | 1,0 | 1,2 | 6,5 | 6,9 |

*The difference between the indicators is significant between the years; p <0.05.

*Table 2*

**Dynamics of chronic cystitis incidence rates among adolescents based on gender (10 thousand people); M ± SD**

| Regions | Teens | | Boys | | Girls | |
|---|---|---|---|---|---|---|
| | 2013 | 2017 | 2013 | 2017 | 2013 | 2017 |
| Western | 0,5±0,2 | 2,0±0,8* | 0,1±0,08 | 0,5±0,08* | 0,8±0,4 | 3,4±1,5* |
| Central | 1,6±0,7 | 2,0±0,5 | 0,4±0,09 | 0,8±0,2* | 1,3±0,3 | 2,0±0,5 |
| Northeast | 0,9±0,04 | 0,7±0,05 | 0,4±0,03 | 0,3±0,02* | 1,4±0,5 | 1,2±0,1 |
| Southeast | 0,8±0,2 | 1,2±0,5* | 0,4±0,2 | 0,6±0,1 | 1,2±0,1 | 1,9±0,8 |
| Southern | 0,6±0,1 | 0,2±0,07* | | | 1,2±0,3 | 0,3±0,1* |
| Kyiv | 3,8 | 1,3 | 0,81 | | 6,9 | 2,6 |
| Ukraine | 1,0 | 1,3 | 0,28 | 0,4 | 1,8 | 2,2 |

* The difference between the indicators is significant between the years; p <0.05.

As can be seen from Table 1, an increase in prevalence was observed, except for the South, in four regions of Ukraine and the city of Kyiv, but only in the Central was it significant. Higher indicators than the average Ukrainian were in the Central (5.2 ± 0.6), North-Eastern (4.8 ± 1.1), Western (4.4 ± 1.4) regions and the capital 8.6. The revealed peculiarity of the sex was not only in the generally higher rates among girls, but also in their growth in all regions except the capital. Among young people, this process was probable only in the Western, and Central regions and the capital during stabilization in the North-East and had the opposite character in the South-East and South. When analyzing the magnitude of the prevalence and dynamics of

changes in the oblasts of the regions, attention is drawn to the Western – Lviv (in 2017 7.2 against 3.3 in 2013), Chernivtsi (12.9 vs. 6.3); in Central – Vinnytsia (7.3 vs. 3.1), Kyiv (5.5 vs. 3.5), Cherkasy (4.9 vs. 2.8); in the North-East – Chernihiv (7.6 vs. 5.2), Sumy (3.7 vs. 2.4); in the South-East – Dnipropetrovsk (3.8 vs. 3.5), Luhansk (9.4 vs. 3.4); Kherson (4.6 vs. 5.8) and Kyiv (8.6 vs. 10.4, respectively) stand out for their high performance. In some cases, these areas coincide in the similarity of changes among boys and girls. That is, 10 regions of Ukraine and the capital need heightened attention for the adoption and implementation of appropriate clinical and organizational measures.

Analysis of the dynamics of registered, including newly detected cases of chronic cystitis in Ukraine in adolescents based on gender is of interest, as noted, in terms of assessing the quality of diagnosis and treatment of its acute form, which in terms of individual areas during decentralization is of particular importance for making managerial and clinical and organizational decisions. The pathology also attracts attention as a separate independent disease, the recurrent nature of which, with the frequency of serious complications in the form of, for example, most often pyelonephritis, is an important medical and social problem. Its actualization is determined by the age period of the contingent. Over the last five years of official statistical reporting (2013-2017), the number of registered adolescents with CC has decreased by 7.5% to 432 people. While maintaining the predominance of girls among them, which accounted for 84 – 86%, it was they who decreased by 9% with the growth (1.5%) of sick boys; in 2017, there were 363 and 69, respectively. Every third of them (30 – 31.5%) was diagnosed for the first time. In total, such cases were practically unchanged – 136 patients, most of whom were girls – 117 and 114 in 2013 and 2017 (86.0 ± 2.9 and 83.8 ± 3.1%, p <0.05). A significant decrease was observed against the background of the tendency to increase the number of young people (by 15.8%) from 19 to 22 patients. The presented data together with other important information are illustrated in Table 3 and Table 4.

*Table 3*

**Dynamics of the number of patients with chronic cystitis in adolescents, taking into account gender**

| Regions | Teens | | | | T п/з % | Boys | | | | T п/з % | Girls | | | | T п/з % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | | 2017 | | | 2013 | | 2017 | | | 2013 | | 2017 | | |
| | абс. | % | абс. | % | | абс. | % | абс. | % | | абс. | % | абс. | % | |
| Western | 91 | 19,5 | 128 | 29,9 | +40,7 | 13 | 19,1 | 17 | 24,6 | +30,8 | 78 | 19,5 | 111 | 30,6 | +42,3 |
| Central | 87 | 18,6 | 99 | 23,0 | +13,8 | 10 | 14,7 | 17 | 24,6 | +70,0 | 77 | 19,3 | 82 | 22,6 | +6,5 |
| Northeast | 45 | 9,6 | 40 | 9,2 | -11,1 | 6 | 8,8 | 5 | 7,2 | -16,7 | 39 | 9,8 | 35 | 9,6 | -10,2 |
| Southeast | 128 | 27,4 | 81 | 18,7 | -36,7 | 23 | 33,8 | 17 | 24,6 | -26,1 | 105 | 26,3 | 64 | 17,6 | -39,0 |
| Southern | 40 | 8,5 | 30 | 7,0 | -25,0 | 9 | 13,2 | 5 | 7,2 | -44,4 | 31 | 7,8 | 25 | 6,9 | -19,4 |
| Kyiv | 76 | 16,3 | 54 | 12,5 | -29,0 | 7 | 10,3 | 8 | 11,6 | +14,3 | 69 | 17,3 | 46 | 12,7 | -33,3 |
| Ukraine | 467 | 100,0 | 432 | 100,0 | -7,5 | 68 | 100,0 | 69 | 100,0 | +1,5 | 399 | 100,0 | 363 | 100,0 | -9,0 |

*Table 4*

**Dynamics of the number of newly diagnosed patients with chronic cystitis among adolescents, taking into account gender**

| Regions | Teens | | | | T п/з % | Boys | | | | T п/з % | Girls | | | | T п/з % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | | 2017 | | | 2013 | | 2017 | | | 2013 | | 2017 | | |
| | абс. | % | абс. | % | | абс. | % | абс. | % | | абс. | % | абс. | % | |
| Western | 25 | 17,0 | 55 | 40,4 | +120 | 4 | 21,0 | 7 | 31,8 | +75 | 19 | 16,2 | 48 | 42,1 | +152,6 |
| Central | 35 | 25,7 | 38 | 28,0 | +8,6 | 2 | 10,5 | 8 | 36,4 | +300 | 33 | 28,2 | 30 | 26,3 | -9,0 |
| Northeast | 10 | 7,4 | 6 | 4,4 | -40,0 | 2 | 10,5 | 1 | 4,5 | -50,0 | 8 | 6,8 | 5 | 4,4 | -37,5 |
| Southeast | 33 | 24,3 | 27 | 19,8 | -18,2 | 8 | 42,1 | 6 | 27,3 | -25,0 | 25 | 21,4 | 21 | 18,4 | -16,0 |
| Southern | 7 | 5,1 | 2 | 1,5 | - 71,4 | - | - | - | - | - | 7 | 6,0 | 2 | 1,7 | -71,4 |
| Kyiv | 28 | 20,6 | 8 | 5,9 | - 71,4 | 3 | 15,8 | - | - | - | 25 | 21,4 | 8 | 7,0 | -68,0 |
| Ukraine | 136 | 100,0 | 136 | 100,0 | - | 19 | 100,0 | 22 | 100,0 | +15,8 | 117 | 100,0 | 114 | 100,0 | -2,6 |

The results of the comparative analysis of the tables reveal the general situation in the country. As can be seen, in three of its regions (Northeast, Southeast, South) and the capital, there was a decrease in adolescents with CC, both among all registered and with a new diagnosis. Its pace, except for the South-Eastern region, is higher than the first. In the Western and Central regions there was an increase in these and other cases, and in the West, with three times more intensity, falling ill for the first time (120% vs. 40.7% of all). This nature

of the dynamics of indicators in the regional aspect is similar for patients of both sexes. Some differences are in the pace of their change. A significant increase in sick adolescents in the Western and Central regions, an uneven decrease in the indices of the other three and the capital affected the structure of their territorial distribution. Thus, if in 2013 most patients were registered in the South-Eastern region (27.4%), then in the Western (19.5%) and Central (18.6%), in 2017 their sequence changed in the following order: Western (29.3%), Central (23.0%) and South-Eastern (18.7%). As before, the other three places in the corresponding sequence were occupied by the capital (12.5%), Northeast (9.2%) and Southern (7.0%) regions. As for the distribution of newly detected cases, in 2013 the first three belonged to the Central (25.7%), South-Eastern (24.3%) regions and Kyiv (20.6%), while in 2017 respectively Western (40.4%), Central (28.0%) and South-Eastern (19.8%). There were 3.5 times fewer of them in Kyiv, which lost its third place and moved to fourth. It should be noted that the above structure with the dynamics of its changes completely coincides with that among girls, which is quite logical taking into account their superiority.

**Discussion.** Analysis of the five-year study of the official statistic reports testified to the growth of readings on morbidity and prevalence of chronic cystitis (CC) among the teenagers in Ukraine by 30.0% and 8.1%; in 2017 they were 1.3 and 4.0 per 10 thousand, respectively. The process was more intensive in youths (by 42.8% and 20.0% against 22.2% and 6.1% in girls, respectively), but the levels of morbidity and prevalence were less (0.4 and 1.2 against 2.2 and 6.9 per 10 thousand of the respective population). That is, the girls are ill 3 times oftener, this coordinates with the data of the majority of authors [**7, 8**]. The data on the growth of infection of the urinary system (IUS), in the structure of which CC is one of the leading places, prevail among teenagers [**2**]. Other authors share the opinion of the dominative place of this pathology among IUS, indicating that its part reaches 60% and in 25% of children with chronic failure of urination is diagnosed CC, 19-20% of them are hospitalized [**7, 8**]. The study of the informative sources did not show exact data for performing comparative analysis. The presence of information concerning IUS in some works cannot be correct with this aim. With this, we find a reference on the available prevalence of cystitis in the child population, including chronic forms, as the most dangerous from the point of its course and complications [**9, 10**]. We agree with the authors, that the actuality of chronic inflammation of the urinary bladder takes an important place in the structure of urologic diseases in children, and the problem of diagnostics and treatment, as usual, is rather actual; we think it important to pay attention again to the data of statistic reports used as a source of information that discovers an important aspect of a problem. It is the active dynamic observation the role which is very important nowadays. Along with this, the percentage of teenagers with cystitis under observation was 2.6% in 201, and it was less than in 2016 when it was 4.1%. The situation demands the actualization of family doctors to keep time the control examination of the contingent, to perform prophylactic measures, and, if necessary, following the results of analysis, to employ nephrologists and urologists for consultation with further tactics of treatment. In each region some oblasts actually shape the situation; they focus on more adolescents with CC and newly diagnosed cases. Thus, in the Western region, such are Ivano-Frankivsk, Lviv, and Chernivtsi, wherein in 2017 sick adolescents accounted for 78.1% of all registered; in Central Vinnytsia, Kyiv, Khmelnytsky (73.0%); in the North-East Dnipropetrovsk, Kharkiv (58.0%); in the South - Kherson (43.3%).

Thus, the above data refer to important from the point of view of their value to make the corresponding clinical-organizing, administrative measures, involving local government bodies, and systems of public health, the role of which in the solution of problems on improving the health of the population and, in the first turn, of children, is one of the leading tasks, especially under circumstances of decentralization which gains its prevalence and extends the possibilities of their implementation into clinical practice.

**Conclusions.** It was established that in Ukraine the incidence and prevalence of chronic cystitis among adolescents of both sexes have increased by 30% and 8.1%, respectively, to 1.3 and 4.0 per 10 thousand from 2013 to 2017. The increase in morbidity and prevalence was more intense in boys to 0.4 and 1.2 against 0.28 and 1.0 (by 42.8% and 20.0%), in girls by 22.2% and 6.1% to 2.2 and 6.9 per 10 thousand. The growth rate of the incidence is 3.6 times higher than in girls and twice as high in boys. There were identified regions with high and increasing levels of incidence and prevalence of chronic cystitis among adolescents of both sexes (Western, Central, Northeastern), as well as 9 areas that stand out among others and affect the situation in Ukraine as a whole (Lviv, Chernivtsi, Vinnytsia, Cherkasy, Chernihiv, Sumy, Dnipropetrovsk, Kherson) and Kyiv. Among the total number of adolescents with chronic cystitis, which in 2017 was 432 people, which is 7.5% less than five years in a row, 30% were cases with a first diagnosis, and the percentage of girls was 84 – 86%.

**Conflicts of interest.** The authors have no conflict of interest regarding the materials of this article.

**Authors' contributions:**

***N. Saidakova:*** concept and design of the study, analysis of the obtained data.

***L. Startseva:*** concept and design of research, formation of conclusions.

***A. Klyus:*** copying indicators, compiling summary tables, statistical data processing.

***O. Onyskiv:*** obtaining and analyzing data on the Western region.

***V. Hrodzinkiyy:*** work with primary documentation (2013-2017), selection of statistical data.

***G. Kononova:*** design the text of the work, and search for sources of information on the topic.

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