ASSESSMENT OF ADOLESCENT MORBIDITY IN VORONEZH OBLAST IN 2013–2022

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Morbidity among adolescents is a significant component of the overall morbidity in Russia, since this part of the population forms the potential of the country. Unfortunately, lately, the efforts to popularize healthy lifestyle and preventive measures, both of which entail decrease of the incidence of diseases in general, were insufficient. This study aimed to analyze the 10-year morbidity patterns among adolescents in Voronezh Oblast, rank pathologies, and compare the findings to the specifics of morbidity in Russia overall. We used statistical data describing diseases (types, incidence) affecting adolescents aged 15–17 in Voronezh Oblast and in Russia; the study covered the period from 2013 through 2022. The analysis of data for Voronezh Oblast revealed a number of classes of illnesses that exhibit significant growth and thus require special attention in the context of development of preventive measures and their implementation in educational establishments. We have also pinpointed the regions of the Central Federal District where, in the recent years, the incidence has been growing more rapidly than in others. The most significant rise of morbidity was registered in Voronezh Oblast. The region- and class-specific differences in the incidence of diseases should be factored in when implementing prevention campaigns and designing more detailed medical examination routines for the adolescents. Individual approach to each case plays an important part in slowing down the rate of morbidity, and it is crucial for the full realization of the potential of the respective efforts.

Keywords: morbidity, children and adolescents, students, pupils, morbidity analysis

Author contribution: Kopylov AS — study planning, literature analysis, data collection; Popov VI — data analysis and interpretation, manuscript drafting.

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АНАЛИЗ ЗАБОЛЕВАЕМОСТИ ПОДРОСТКОВ ВОРОНЕЖСКОЙ ОБЛАСТИ В 2013–2022 ГГ.

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Заболеваемость среди подростков занимает важное место в структуре заболеваемости по России, ведь именно подростки в недалеком будущем станут отражением потенциала нашей страны. К сожалению, в последнее время недостаточно внимания уделяют приобщению к здоровому образу жизни, профилактическим мероприятиям, способствующим снижению темпов прироста заболеваемости. Целью работы было изучить заболеваемость в Воронежской области за десятилетний период, выявить приоритетные патологии подросткового населения и выполнить сравнение с уровнем заболеваемости по России. Для анализа использовали официальные статистические данные по заболеваемости среди подростков 15–17 лет в Воронежской области и в России за период с 2013 по 2022 г. При проведении статистического анализа в Воронежской области выявлены демонстрирующие существенный прирост приоритетные классы заболеваний, на которые необходимо обратить особое внимание при разработке профилактических мероприятий и их внедрении в образовательную среду. Среди областей Центрального федерального округа отмечены регионы с наиболее быстро растущей в последние годы заболеваемостью. В последние несколько лет отмечен рост заболеваемости, при этом особенно значительным он был в Воронежской области. Различия уровней заболеваемости по регионам и классам болезней необходимо учитывать при проведении диспансеризаций и более тщательных и детальных обследований подросткового населения. Чтобы замедлить темпы прироста заболеваемости подростков, для достижения максимального эффекта важен индивидуальный подход.

Ключевые слова: заболеваемость, дети и подростки, учащиеся, школьники, анализ заболеваемости

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As shown by many researchers, the morbidity rate in the Russian Federation (RF) is fairly high. This fact suggests implementation of selective preventive measures that factor in the specifics of each region of the RF. Reduction of the overall incidence rate has always been one of the most important and significant domestic policy tasks in our country, and development and realization of preventive efforts enable solutions thereto [1–5].

Various sources indicate that, in general, only 25% of school-age children are fully healthy. This figure drops considerably among senior pupils: they develop disorders of the musculoskeletal system, their visual acuity drops, and digestive systems suffer disruptions [6–8]. Thus, it is necessary to introduce adolescents to healthy lifestyle from their early days in school, tell them about the optimal amounts of motor activity, and teach to adhere to such recommendations throughout their lives [9]. Unfortunately, lately, the role of family and parents in shaping personality of an adolescent received insufficient attention. Often, parents lack proper knowledge in the field of medicine and preservation of children's health, and they do not consider it important to lead a healthy lifestyle and thus lead the younger generation by example. It is necessary to develop programs aimed at raising parents' awareness of health-related matters so they could help their children to live a healthy life [10].

Adolescence is extremely important for the development and formation of the body in general. This is when a person has his/her organs and systems taking their ultimate shape, and body grows close to its limits in length [11]. This is also a period

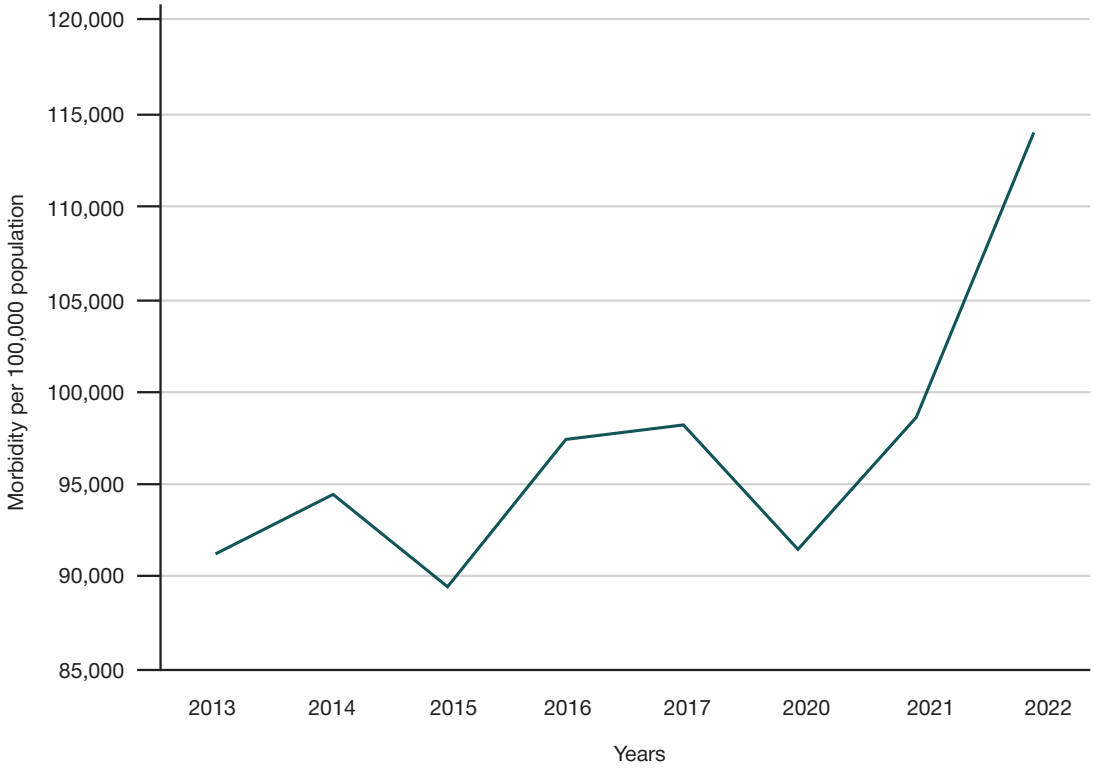

Fig. Dynamics of morbidity among adolescents aged 15-17 years in 2013–2022

of significant education-related loads, when the pupil has to learn much new information, and prepare for the next step, studying at a higher education establishment. These factors affect the quality of life, and can lead to various pathologies in the future [12]. In our country, the morbidity patterns among the youth can differ significantly between federal districts. Investigation of the specifics peculiar to a given region is one of the fundamental measures enabling the maximum possible realization of the potential of the designed prevention campaigns [13].

In the Central Federal District (CFD), 2010 to 2017, the overall morbidity rate went down, but in Voronezh Oblast, which is part thereof, the incidence rate grew by 18% (per 1000 people) from 2011 to 2022. It should also be noted that in 2010–2017, Voronezh Oblast climbed four positions in the general morbidity territorial rating, with the increase in percents equaling 8% [14].

As for the incidence among adolescents, Voronezh Oblast rose up to the third place, although in 2014, it showed the lowest level of morbidity per 100,000 population; this fact is certainly a reason for concern [15, 16]. Recently, insufficient attention has been paid to the study of morbidity in individual districts of our country and a targeted analysis of the most problematic regions with subsequent development of a set of measures aimed at reducing the morbidity growth rate.

This study aimed to analyze the 10-year morbidity patterns among adolescents in Voronezh Oblast, rank pathologies in this cohort, and compare the findings to the specifics of morbidity in Russia overall.

METHODS

By design, this was a retrospective study; we used the statistical data on morbidity among adolescents (first-time diagnoses) accumulated by the Territorial Body of the Federal State Statistics Service for Voronezh Oblast from 2013 through 2022, and the general Russian incidence statistics for the population aged 15–17 years. Incidence growth and proportions of the diseases were calculated based on the ICD 10 definitions. We used standard methods of statistical analysis and MyOffice 2022 software package (New Cloud Technologies; Russia).

RESULTS

The analysis of the 10-year dynamics of morbidity among adolescents aged 15–17 years revealed a fairly high level of this indicator. It is also important to note that over the past few years, the incidence among adolescents has increased significantly: from 2020 to 2022, the respective figure has grown by about 25% (Fig.).

Studying morbidity as a whole, it is important to factor in its structure in order to develop prevention programs as effectively as possible. Table 1 presents such a structure over a 10-year period, broken down by disease classes. Therein, respiratory diseases occupy the top spots with a noticeable margin, and within the considered period, their incidence has grown by over 40%, which is significant. Two other classes worth mentioning are comprised of the diseases of the ear and mastoid process, and digestive system. The increase for them amounted to 26.9 and 44.6%, respectively. A significant (43.8%) growth of the incidence of diseases falling into the Neoplasms class is the reason for significant concern, especially considering its rate of increase and the affected population, adolescents. At the same time, we registered a significant drop of congenital anomalies (76.7%), with the respective figure approaching the zero point. The percentage of mental and behavioral disorders has more than halved, and the number of infectious and parasitic diseases has decreased by 40.7%. Despite the impressive increase in the overall morbidity over the past few years, eye diseases demonstrate a positive trend: their incidence has dropped 1.5 times, regardless of the ever increasing availability of various electronic devices, including to adolescents 15–17 years old. We have also seen a significant decrease in the incidence of skin

Table. 1. Morbidity of adolescents aged 15–17 in Voronezh Oblast in 2013–2022 (per 1000 population)

Classes of diseases	Years										Growth rate, %
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022/2013
Total, including:	912.8	926.1	893.8	977.2	968.8	980	963.7	914.4	983.9	1130.8	+23.9
Some infectious and parasitic diseases	21.4	19.6	18	20.2	18	19.5	20.7	14.5	11.9	12.7	-40.7
Neoplasms	1.6	1.9	2.1	2.1	2	2.9	2.2	1.8	2	2.3	+43.8
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	3.2	3.3	3.1	3.6	3.7	3.7	4.3	3.6	3.6	3.5	+9.4
Endocrine, nutritional and metabolic diseases	21.3	29.6	37.4	30.9	32.7	29.7	33.5	18.5	22.4	18.3	-14.1
Mental and behavioral disorders	25	25.2	20.7	16.7	14.2	17.3	15.9	8.2	10.6	12	-52
Nervous system diseases	27.3	23.5	23.9	23.8	20.7	23.4	18.8	17.7	20.1	20.6	-24.5
Diseases of the eye and adnexa	52.3	53.4	47.6	45.5	47.8	50.7	51.1	35.5	30.1	34.1	-34.8
Diseases of the ear and mastoid process	36.5	38.7	51.1	53.5	46.6	46.2	45.8	43.1	44.9	46.3	+26.9
Diseases of the circulatory system	12.5	12.6	12.3	10	11	10.8	14.2	8.3	10.6	9.9	-20.8
Respiratory diseases	414.2	405.9	376.3	469.1	475.5	466.4	457.7	464.5	491.5	591	+42.7
Diseases of the digestive system	31.6	40.5	45	51.8	51.2	55.6	46.6	42.1	46.7	45.7	+44.6
Diseases of the skin and subcutaneous tissue	44.2	51.2	31.8	28.4	22.3	27.5	37.1	29.1	26.8	23.8	-46.2
Diseases of the musculoskeletal system and connective tissue	44.2	57.3	63.3	53.2	47.8	44.4	39.9	30.5	32.6	25.6	-42.1
Diseases of the genitourinary system	43.4	38.8	40.6	51.1	38.3	37.5	45.6	41.1	46.7	37.4	-13.8
Congenital malformations, deformations and chromosomal abnormalities	3	2.8	2.8	2.6	2.4	2.2	0.8	0.5	0.8	0.7	-76.7
Injury, poisoning and certain other consequences of external causes	98.4	109.2	108.5	110.2	132.7	139.2	122.8	119.1	101	100	+1.6

diseases and musculoskeletal system disorders, which may indicate that the respective preventive measures were effective. Finally, the share of nervous system disorders has dropped by a quarter, demonstrating a positive trend.

Some patterns emerged in the comparative analysis of the morbidity data on adolescents aged 15–17 years in various regions of the Central Federal District and comparison thereof with the data on incidence in Russia overall (Table 2). In general, the incidence rate in the Central Federal District is slightly lower than in the country on the whole, but, over the past few years, the figure has increased significantly (by 22% from 2020 to 2022). It should be underscored that within the past ten years, Central Federal District had the level of morbidity higher than the Russian average: this situation was registered in 10 out of 18 regions constituting the CFD, with Orlov Oblast, where the morbidity level was 1.5 times higher, performing the worst, followed by Vladimir Oblast and Tver Oblast, with Kaluga Oblast almost on par with the latter. In 2022, the lowest morbidity was registered in Lipetsk Oblast: compared to 2013, it dropped by the impressive 16.1%, which is significant against the data collected in other regions. Only the city of Ivanovo has shown an even more drastic decrease by 18%. Over the past several years, Kursk Oblast was the leading region in terms of morbidity per 100,000 population (adolescents); Lipetsk Oblast took the first place only in 2022. In 2013, Voronezh Oblast had the lowest incidence in the CFD, and by 2022 it moved to the third place in this rating. Within the period considered, the capital of the Black Earth Belt had morbidity growing up significantly, by 25%. The situation was more dire only in Orel and Yaroslavl Oblasts, where the rise was by 34% and 26.4%, respectively. Moscow, the capital of our country, has also been no exception: over the past three years, morbidity there has grown, and the increase thereof 2013 through 2022 equaled 10%. In Moscow Oblast, however, the situation is different, and exemplary: there, the incidence decreased by 3.3%.

DISCUSSION

The analysis showed that over the past few years, the level of morbidity among adolescents has been increasing steadily. This fact should stimulate development of the new prevention programs for schoolchildren aged 15–17 years that would be aimed at arresting the growth of incidence of chronic diseases in this population. In addition, it is necessary to factor in the predominant classes of diseases by regions, since they may differ area to area, and target the efforts on the groups of pathologies that spread the fastest in order to slow down this process.

The researchers note that the number of inaugural diagnoses has been growing over the past few years, but in 2020 it decreased significantly, probably due to the introduction of measures against the coronavirus infection, which was spreading rapidly then. Yet, the contribution of COVID-19 to the growth of morbidity was insignificant [11]. In Voronezh Oblast, on the contrary, the incidence of infectious diseases was dropping since 2019; from 2019 through 2020, the overall morbidity trend was downward, but in the next few years, it increased significantly.

Respiratory disorders are, by a wide margin compared to other classes of diseases, the most common in Voronezh Oblast. Over the ten-year period, their incidence has grown significantly, which should trigger the design of preventive measures against this pathology. Other two classes deserving more attention are the diseases of the digestive system,

Table 2. Morbidity of adolescents aged 15-17 (first-time diagnosis) by the subjects of the CFD in 2013–2022

Territory	Year								Growth rate, %
	2013	2014	2015	2016	2017	2020	2021	2022	2022/2013
Russian Federation	143754.8	143109.3	137383.8	137181.8	138346.1	121889	137118.7	149143.8	+3.8
Central Federal District	138032.5	137436.6	130667.6	133799.3	134543.4	119508.7	133758.4	143828.5	+4.2
Belgorod Oblast	163764.7	178353.6	160843.1	170251.4	161591.9	124869.5	151980.3	151457.7	-7.5
Bryansk Oblast	180715.6	183270.6	161278.9	150459.3	151855.9	132764.7	145338.3	161312.4	-10.7
Vladimir Oblast	168156.4	174301.6	168285.9	173935	166884.5	142880.7	160147.2	185582.9	+10.4
Voronezh Oblast	91276.7	94335	89383.6	97389.1	98142.4	91439.7	98521.4	114010.1	+24.9
Ivanovo Oblast	175735.4	186707.9	164589.1	173030.8	175945.9	132823.2	136546.2	144173.9	-18
Kaluga Oblast	152402.1	137842.8	136401.1	140576.4	144101.9	156872.9	175459.7	178242	+17
Kostroma Oblast	141276.5	132133	125290.4	130505.2	145439.2	120105	131400.2	146301.7	+3.6
Kursk Oblast	97396.4	95738.1	81169.2	92641.9	97262.6	80215.9	95071.2	106752.2	+9.6
Lipetsk Oblast	114896.3	116916	105494.1	103989.5	108117.2	100676.6	100362.1	96450.8	-16.1
Moscow Oblast	139830.1	142025.1	140379.4	142486.3	147807.5	132224.9	143314.1	135272.8	-3.3
Orel Oblast	165657.4	168735.8	171081.9	168766.4	167646.9	145575.2	169146.8	221990.6	+34
Ryazan Oblast	152288.8	154476.5	140546.6	143187.8	137803.3	146656.1	155075.4	167176	+10
Smolensk Oblast	165732.4	167744.6	139908	153609.5	158116.4	117803.9	124545.7	139083.1	-16.1
Tambov Oblast	131915.4	132282.2	136168.3	132420.7	129372.1	119597.2	130179.7	152985.3	+16
Tver Oblast	171589.3	172369.5	167687.8	154723.4	159685.2	132726.7	149951.5	178524.7	+4
Tula Oblast	151805.4	143560.3	132664.3	128883.4	132184.4	123398.7	135152.5	162789.7	+7.2
Yaroslavl Oblast	128432	129092.1	131939.3	145029.7	144951.5	126692.6	146381.5	162376.6	+26.4
City of Moscow	125292.6	120236.2	115923.5	120358.4	118284.3	105829.4	129825.9	137754.8	+9.9

and neoplasms, which have also shown significant growth within the studied period.

Compared to the situation in the Far Eastern Federal District, the level of gastrointestinal morbidity in Voronezh Oblast has grown significantly, but the number of cases of disorders of the musculoskeletal system and connective tissue decreased. Respiratory pathologies, which, as mentioned above, are the most common, and tend to spread further, should be viewed as the generalizing factor [17].

In the CFD, Orel Oblast and Yaroslavl Oblast are the regions raising special concerns about morbidity among adolescents: there, it has grown significantly in the past 10 years. While showing a relatively low level of incidence, the capital of the Black Earth Belt has seen the growth rate a quarter greater than that registered in 2013. Ivanovo, Lipetsk, and Smolensk Oblasts demonstrate the best dynamics, with the morbidity figures dropping by 16 to 18%.

It is important to account for the environmental conditions in each region, factor in the environmental indicators that contribute to the development of certain diseases. This is especially important for the pathologies of respiratory and cardiovascular systems, and infectious diseases, since said conditions can trigger exacerbations of the chronic processes [18, 19]. Therefore, it is essential to comprehensively address the increasing morbidity of various organs and systems in collaboration with hygienists, epidemiologists, and pediatricians. It is important to remember the specifics of a growing adolescent body, which is particularly vulnerable between the ages of 15 and 17, when most body systems are taking their ultimate shape [17, 20].

Many authors note that the health of adolescents generally deteriorates, with some schoolchildren classified as belonging to the fifth health group. This classification may indicate an insufficiency of efforts aimed at reinforcing child health and preventing disease. The approach should be systematic, with involvement of medical doctors of various specialties, parents, and school staff, from teachers to principals [21–23].

CONCLUSIONS

Both in Voronezh Oblast and Russia in general, the morbidity among adolescents has been growing in the recent years, becoming an especially important problem. The shares of nosologies in the overall incidence, priority risk factors etc. can vary significantly in different regions of the country. Therefore, it is necessary to carefully and purposefully study the pathologies affecting specific organs and systems, develop prevention programs tailored to the region, and apply an individual approach.

The results of the comparative analysis suggest that in the Voronezh Oblast, special attention should be paid to diseases of the respiratory and digestive systems, as well as neoplasms, which are the most common first-time diagnoses and are increasing in incidence. Compared to other regions of the Central Federal District, the capital of the Black Earth Belt has the second-lowest incidence, following only the Kursk and Lipetsk Oblasts, but the respective figure has increased by 24.9% over the past decade. It is also important to note that in 2013, the level of morbidity in Voronezh Oblast was the lowest among the constituents of the Central Federal District. A comparison with the overall national incidence figures has shown that in the said Oblast, the number of first-time diagnoses was 1.5 times lower than the national average in Russia.

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