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EPIDEMIOLOGICAL CHARACTERISTICS OF NOROVIRUS INTESTINAL INFECTION AMONG CHILDREN IN BAKU CITY

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✓ ***Resume***

The article presents the results of studying some epidemiological characteristics of norovirus intestinal infection among children in Baku. The aim of the study was to determine the incidence of norovirus intestinal infection among children in different age and gender groups, as well as depending on the season, and to characterize the epidemic process.

411 children aged 0-18 who were admitted to various children's hospitals in Baku city were examined by the enzyme immunoassay method for some intestinal viruses - group A rotavirus, serotype 40/41 adenovirus and norovirus.

The maximum level of detection of intestinal infection with norovirus is noted in the 1-3 age group, which is 35.4±3.0%. The incidence of norovirus intestinal infection was higher among boys (56.1±3.2%) than among girls (43.9±3.2%). Intestinal infection with norovirus was observed more in the spring season (46.7±3.2%), less in the autumn season (11.4±2.0%). During norovirus intestinal infection, the period of the epidemic process seems to consist of 2 high and one low amplitude cycles with the epidemic rise and fall of the incidence recorded in almost all seasons of the year.

In 2018, between 2 virus associations, RV±NV – 8.5%, AdV+NV – 6.8% and RV+AdV – 10.2% of cases, 3 virus associations RV+AdV+NV were identified in 6.8% of cases has been done. In 2019, between 2 virus associations, RV+NV – 5.5%, AdV+NV – 20.8% and RV+AdV – 8.2% were recorded. 3 viral association RV+AdV+NV – confirmed in 5.1% cases. In 2020, between 2 virus associations, RV+NV – 15.3%, AdV+NV – 23.7% and RV+AdV – 8.5% were detected by chance. 3 viral associations were identified as RV+AdV+NV – 5.1%.

Key words: norovirus, rotavirus, adenovirus, epidemic process, children

ЭПИДЕМИОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА НОРОВИРУСНОЙ КИШЕЧНОЙ ИНФЕКЦИИ СРЕДИ ДЕТЕЙ В ГОРОДЕ БАКУ

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✓ ***Резюме***

В статье представлены результаты изучения некоторых эпидемиологических особенностей норовирусной кишечной инфекции среди детей города Баку. Цель исследования - определить частоту встречаемости норовирусной кишечной инфекцией среди детей в разных возрастных и половых группах, а также в зависимости от сезона, охарактеризовать эпидемический процесс.

411 детей в возрасте от 0 до 18 лет, поступившие в различные детские больницы города Баку, были обследованы методом иммуноферментного анализа на некоторые кишечные вирусы - ротавирус группы А, аденовирус серотипа 40/41 и норовирус.

Максимальный уровень встречаемости кишечной инфекции норовирусом в 1-3 возрастной группе составляет 35,4±3,0%. Заболеваемость норовирусной кишечной инфекцией среди мальчиков была выше (56,1±3,2%), чем среди девочек (43,9±3,2%). Кишечная инфекция норовирусом наблюдалась чаще в весенний сезон (46,7±3,2%), реже в осенний сезон (11,4±2,0%). При норовирусной кишечной инфекции период эпидемического

процесса, состоял из двух высокоамплитудных и одного низкоамплитудных циклов, при этом эпидемический подъем и спад заболеваемости регистрируются практически во все сезоны года.

В 2018 году из 2 вирусных ассоциаций РВ±НВ – 8,5%, АдВ+НВ – 6,8% и РВ+АдВ – 10,2% случаев, 3 вирусные ассоциации РВ+АдВ+НВ выявлены в 6,8% случаев. В 2019 году между двумя вирусными ассоциациями зафиксированы РВ+НВ – 5,5%, АдВ+НВ – 20,8% и РВ+АдВ – 8,2%. 3 вирусная ассоциация РВ+АдВ+НВ – подтверждена в 5,1% случаев. В 2020 году среди двух вирусных ассоциаций случайно выявлены RV+NV – 15,3%, AdV+NV – 23,7% и RV+AdV – 8,5%. 3 вирусные ассоциации идентифицированы как RV+AdV+NV – 5,1%.

Ключевые слова: норовирус, ротавирус, аденовирус, эпидемический процесс, дети

BOKU SHAHRIDAGI BOLALAR ORASIDAGI NOROVIRUS ICHAK INFEKTSIONINING EPIDEMIOLOGIK XUSUSIYATLARI

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✓ ***Rezyume***

Maqolada Boku shahridagi bolalar o'rtasida norovirus ichak infektsiyasining ayrim epidemiologik xususiyatlarini o'rganish natijalari keltirilgan. Tadqiqotning maqsadi turli yosh va jinsdagi bolalar o'rtasida, shuningdek, mavsumga qarab norovirusli ichak infektsiyasini aniqlash va epidemik jarayonni tavsiflash edi.

Boku shahridagi turli bolalar shifoxonalariga yotqizilgan 0-18 yoshli 411 nafar bola ayrim ichak viruslari - A guruhi rotavirus, 40/41 serotip adenovirus va noroviruslarga ferment immunoassay usulida tekshirildi.

Boku shahridagi turli bolalar shifoxonalariga yotqizilgan 0-18 yoshli 411 nafar bola ayrim ichak viruslari - A guruhi rotavirus, 40/41 serotip adenovirus va noroviruslarga ferment immunoassay usulida tekshirildi.

Norovirus bilan ichak infektsiyasini aniqlashning maksimal darajasi 1-3 yosh guruhida qayd etilgan, bu 35,4±3,0% ni tashkil qiladi. Norovirus ichak infektsiyasi bilan kasallanish o'g'il bolalarda (56,1±3,2%) qizlarga nisbatan (43,9±3,2%) yuqori bo'ldi. Norovirus bilan ichak infektsiyasi bahor mavsumida ko'proq (46,7±3,2%), kuz mavsumida kamroq (11,4±2,0%) kuzatildi. Norovirusli ichak infektsiyasi davrida epidemik jarayon davri yilning deyarli barcha fasllarida qayd etilgan kasallanishning epidemik o'sishi va pasayishi bilan 2 ta yuqori va bitta past amplitudali tsikldan iborat bo'ladi.

2018 yilda 2 ta virus assotsiatsiyasi, RV±NV – 8,5%, AdV+NV – 6,8% va RV+AdV – 10,2%, 6,8% hollarda 3 ta RV+AdV+NV virus assotsiatsiyasi aniqlangan. 2019-yilda 2 ta virus assotsiatsiyasi o‘rtasida RV+NV – 5,5%, AdV+NV – 20,8% va RV+AdV – 8,2% qayd etilgan. 3 virusli assotsiatsiya RV+AdV+NV – 5,1% hollarda tasdiqlangan. 2020 yilda 2 ta virus assotsiatsiyasi orasida RV+NV – 15,3%, AdV+NV – 23,7% va RV+AdV – 8,5% tasodifan aniqlangan. 3 ta virusli assotsiatsiyalar RV+AdV+NV – 5,1% sifatida aniqlandi.

Kalit so'zlar: norovirus, rotavirus, adenovirus, epidemik jarayon, bolalar

Relevance

Viral acute gastroenteritis (AGI) is an urgent health problem in several countries of the world and is the cause of 1.45 million deaths annually [1-4]. The results of epidemiological studies show that in the last 10 years, in most regions of the world, mass outbreaks and even epidemics of viral CKD, the leading etiological role of which belongs to viral agents, have been recorded. The share of viral CKD in the structure of acute intestinal infections (ACI) is 20-70% [5-9].

Rotaviruses, enteroviruses, noroviruses, sapoviruses, adenoviruses, and human astroviruses are reported among the etiological factors of viral CKD [8-14].

Among the etiological factors of viral diarrhea, noroviruses are the second most common after rotavirus. Often these viruses are the main causes of nosocomial infections, causing outbreaks in children's groups. In many cases, these viruses are recorded together in the same patient by chance.

According to the data of various authors, noroviruses cause 14-18% of all CBI in children as a monoinfection, and 40% together with other enteric viruses and bacteria [10, 13, 18, 19].

The aim of the study was to determine the incidence of norovirus intestinal infection among children in different age and gender groups, as well as depending on the season, and to characterize the epidemic process.

Material and methods

The aim of the study was to determine the incidence of norovirus intestinal infection among children in different age and gender groups, as well as depending on the season, and to characterize the epidemic process.

Fecal samples collected from the contingent of 0-18-year-old children admitted to various children's hospitals in Baku were examined by serological methods for some intestinal viruses - group A rotavirus, serotype 40/41 adenovirus and norovirus. A total of 411 pediatric patients were examined - 59 samples (14.4) in January-December 2018, 293 samples (71.3) in January-October 2019, February-March 2020 with 59 samples (14.4%) in

The structure of the examined children by age groups was as follows: up to 1 year old - 93 people (22.6%); 1-3 years old – 129 people (31.4%); 3-7 years old – 98 people (23.8%); Over 7 years old – 91 people (22.1%). 219 (53.3%) were boys, and 192 (46.7%) were girls.

A test-system based on a solid-phase "sandwich" variant was used for the determination of group A rotavirus, serotype 40/41 adenovirus and norovirus antigens in the fecal sample by immunoenzyme analysis method (R-Biopharm, RIDASCREEN, Germany). The reaction was carried out according to the manufacturer's instructions.

During the study of the epidemiological characteristics of viral intestinal infections, descriptive-evaluation and analytical epidemiological research methods were used.

Statistical processing of the results was carried out with the help of the SPSS-26 software package. The integrity of differences between independent groups was assessed using the Mann-Whitney U-test. At the same time, the statistical processing of the results was carried out using the qualitative dispersion analysis method with the estimation of statistical significance according to Fisher.

The statistical significance of the differences between the quality indicators in the examined groups was evaluated using the $\chi 2$ - Pearson's test and Fisher's exact test. The level of confidence was $p<0.05$.

Result and discussions

Detection of group A rotaviruses as an etiological factor of monovirus intestinal infection was 23.6±2.1%, 40/41 serotype adenoviruses were 29.2±2.2%, and noroviruses were 59.9±2.4%. As can be seen, more noroviruses can be mentioned according to the frequency of occurrence (Fig. 1).

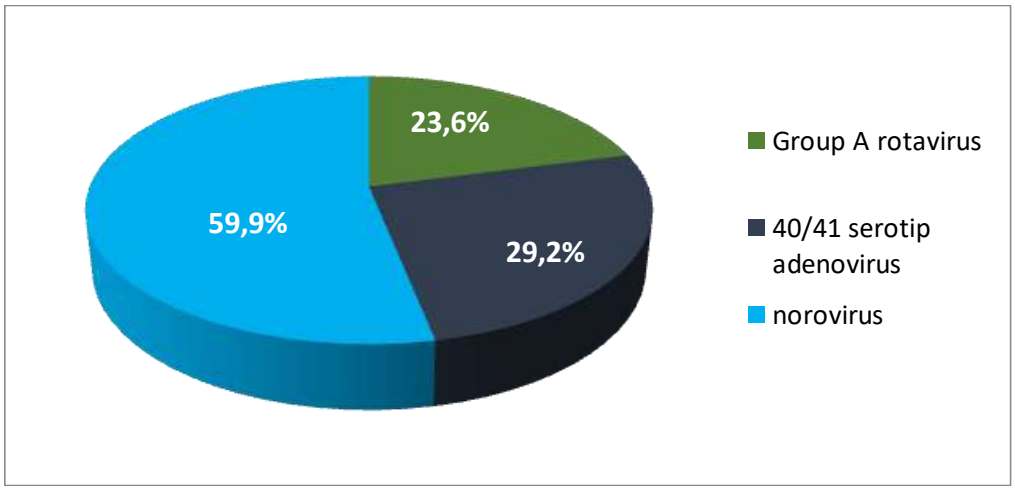

Figure 1. Etiological structure of monovirus intestinal infection among children

Intestinal infection with norovirus occurred in 48 people (19.5±2.5) among children under 1 year old, 87 people in the 1-3 age group (35.4±3.0), 64 people among 3-7-year-old children (26, 0±2.8%) and was recorded in 47 children (19.1±2.5%) in the age group over 7 years old. In general, the incidence of

intestinal infections confirmed by the above-mentioned intestinal viruses as an etiological factor is 19.2±2.3% under 1 year of age, 35.4±2.8% in the 1-3 year age group, 25.4±2.8% in the 3-7 year age group ,6±2.5% and 19.9±2.3% in the age group over 7 years old (p<0.001).

Apparently, among the etiological agents of monovirus intestinal infection among the examined contingent of children, more noroviruses were included, followed by 40/41 serotype adenoviruses and group A rotaviruses. The maximum level of detection of viral intestinal infection in the studied age groups in children occurred in the 1-3 age group - 35.4±2.8%. The lowest detection level of viral intestinal infection was observed among children under 1 year of age – 19.2±2.3% (p<0.001).

The results of the incidence of various viral intestinal infections depending on gender among the children's contingent are given in table 1.

Table 1

Incidence of various viral intestinal infections among children depending on gender

№	Sex	Group A rotavirus		40/41 serotip adenovirus		norovirus	
		Absolute number	%±m	Absolute number	%±m	Absolute number	%±m
1	Boys	50	22,8±2,8	72	32,9±3,2	138	56,1±3,2
2	Girls	47	24,5±3,1	48	25,0±3,1	108	43,9±3,2

It is clear from table 1 that the frequency of intestinal infection with serotype 40/41 adenovirus and norovirus among boys was the highest compared to other enteric viruses among both boys and girls - 56.1±3.2% and 43.9±3 ,2%. being.

Adenovirus serotype 40/41 was on the 2nd place according to the frequency of occurrence - in boys - 32.9±3.2; in girls – 2.5±3.1. In general, monovirus intestinal infection was observed in 52.9±4.0% of boys and 47.1±4.0% of girls.

In 2018, more group A rotavirus intestinal infections (27.1%) were recorded among the examined children's contingent, while in 2019, among viral intestinal infections, norovirus intestinal infection prevailed due to its specific weight - 71.3±2.2 %. In 2020, in the structure of viral intestinal infections among children, a high level of group A rotavirus intestinal infection was again observed - 33.9%.

In general, if we look at the 3-year study period, we can see that in 2018 and 2020, the viral intestinal infection recorded among children was found with almost the same frequency (15.5±2.1% and 13.8± 2.0%), the incidence of viral intestinal infection in 2019 was slightly higher - 70.7±2.6%.

When analyzing the frequency of detection of norovirus intestinal infection among children depending on the season, we see that the maximum detection level of this infection falls in the spring season - 46.7±3.2%, and the minimum detection level falls in the autumn season - 11.4±2.0% . Intestinal infection with norovirus was observed with almost the same frequency in the summer and autumn seasons: in the summer season - 11.8±2.1% and in the autumn season - 11.4±2.0% (Fig. 2).

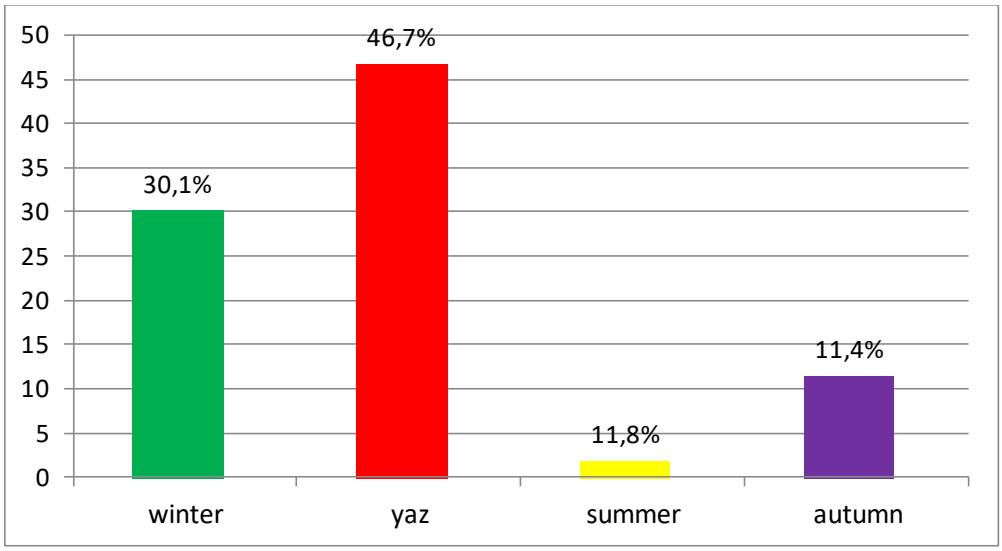

Figure 2. Seasonal incidence of norovirus intestinal infection among children

The study of the dynamics of incidence of norovirus intestinal infection among children by months showed that the period of the epidemic process during norovirus intestinal infection consists of cycles of epidemic rise and fall of morbidity recorded in all seasons almost throughout the year (Fig. 3).

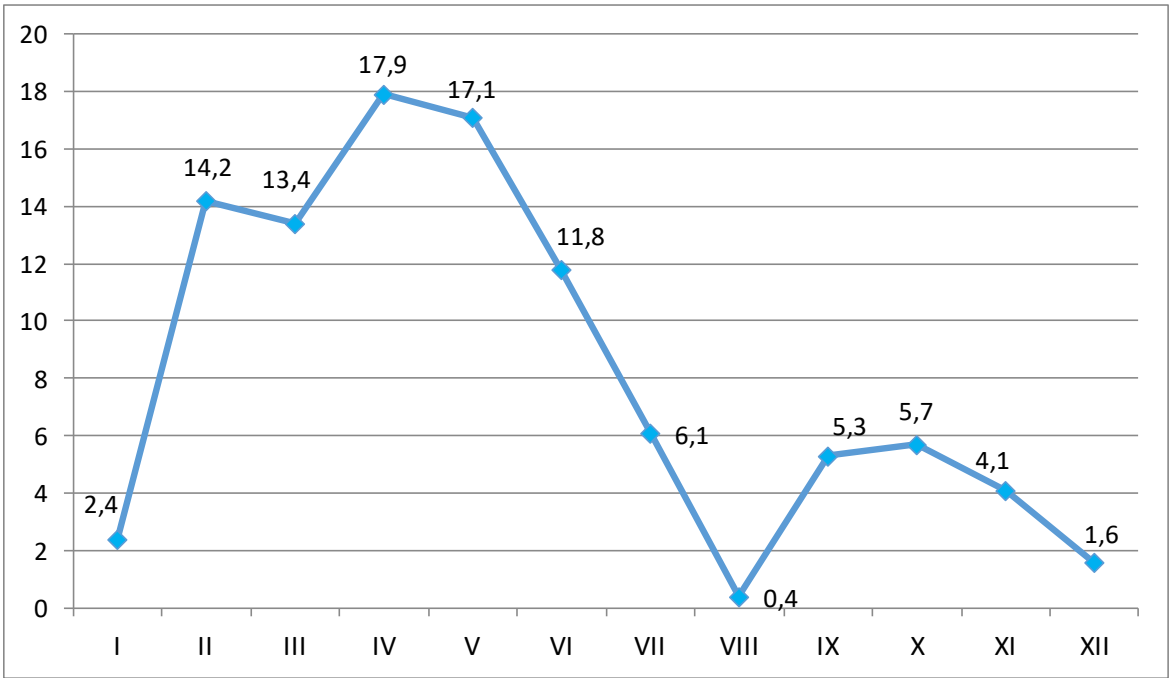

Figure 3. Average annual monthly dynamics of incidence of norovirus intestinal infection among children

Among the 4 recorded epidemic cycles, there were 2 high and one low amplitude cycles. The incidence of norovirus intestinal infection among children began to increase from February, and the first epidemic increase was recorded -14.2±2.2%, the incidence, which began to increase at a slower pace from March, was completed by the second epidemic increase in April - 17.9±2.4%. The third moderate-amplitude epidemic cycle was defined as an incidence rate of 11.8±2.1% in June, then continued to increase again starting in July, reaching 5.3±1.4% and 5.7±1% in September and October, respectively. It was 1.5%. The duration of all cycles of the epidemic process during illness with norovirus intestinal infection is 2 months. When comparing the course of the epidemic process during illness with group A rotavirus, serotype 40/41 adenovirus and norovirus intestinal infections among children, it can be seen that, while group A rotavirus intestinal infection was not detected in August, morbidity with 40/41 serotype adenovirus intestinal infection reached the maximum level. (100.0%), norovirus intestinal infection was determined as 1 case – 0.4±0.4%. The clearly visible winter-summer seasonality of norovirus intestinal infection, like that of 40/41 serotype adenovirus intestinal infection, is noteworthy.

During the study period, in 2018, 2 virus associations occurred in 17 people (28.8±5.9), 3 virus associations in 4 people (6.8±3.3), in 2019, 2 virus associations in 86 cases (29, 4±2.7%) and 3 viral associations in 15 cases (5.1±1.3%), in 2020, 2 viral associations in 19 children – 32.2±6.1% and 3 viral associations in 3 children – It was found to be 5.1±2.9%. In 2018, between 2 virus associations, RV+NV association in 20.3±5.2% of cases (12 people), AdV+NV association in 18.6±5.1% (11 people) and RV+AdV association in 10.2 It was determined in ±3.9% of cases (6 people), and among the 3 viral associations, the presence of RV+AdV+NV intestinal viruses was observed in 4 people (6.8±3.3%). In 2019, between 2 virus associations, RV+NV – in 46 people (15.7±2.1%), AV+NV – in 61 people (20.9±2.4%) and RV+AdV – in 24 people (8 ,2±1,6%) were found and 3 viral associations were confirmed in 5,1±1,3% of 15 people.

In 2020, between 2 virus associations, RV+NV – 15.3±4.7% in 9 people, AdV+NV – 23.7±5.5% in 14 people, and RV+AdV – 8.5± 5 people 3.6% was found. 3 viral associations were identified as RV+AdV+NV (5.1±2.9%) in 3 people.

The association of 2 viruses was recorded in 12.9±3.5% in the age group up to 1 year, and 41.1±4.3% in the 1-3 age group. The maximum frequency of detection of mixed viral intestinal infection with 3 viral associations was observed in the age group of 1-3 years, with 6.2±2.1%, and 3 viral associations were recorded with almost the same frequency in the age group of up to 1 year and in the age group of 3-7 years. received – 5.4±2.3% and 5.1±2.2%. 3 viral associations were registered at least in the age group over 7 years old - 4.4±2.1%.

The frequency of occurrence of mixed viral intestinal infection with 2 and 3 viral associations among the children's contingent depending on gender is given in figure 4.

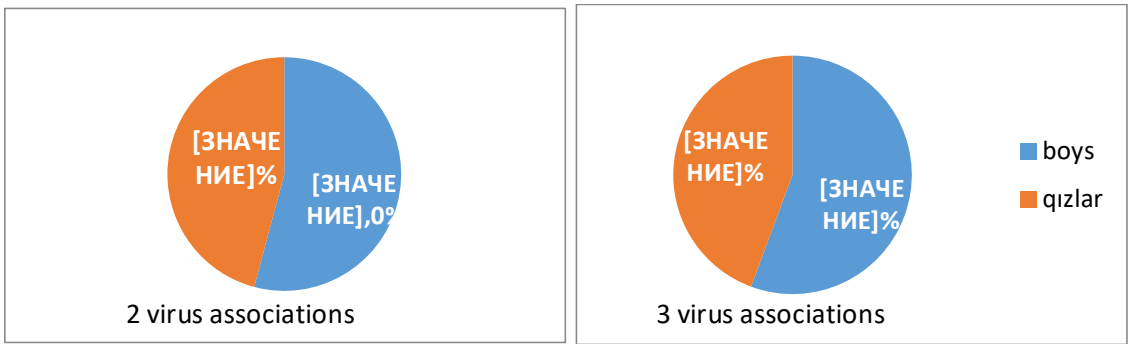

Figure 4. Frequency of occurrence of virus associations
2 and 3 among the child contingent depending on gender

Figure 4 also shows that both 2-virus association and 3-virus association were more common among boys - 32.0±3.2% and 5.9±1.6%, respectively. Among girls, 3 virus associations were observed less often - 4.7±1.5%.

Among the examined children, the degree of participation of group A rotaviruses, serotype 4041 adenoviruses and noroviruses as etiological agents of mixed viral intestinal infections with 2 and 3 viral associations was also investigated, and the results are illustrated in the diagram below.

The specific weight of noroviruses in the structure of etiological agents of mixed viral intestinal infections with 2 viral associations among children was 53.9±2.4%. According to the specific gravity, serotype 40/41 adenoviruses took the second place - 29.2±2.2%, followed by group A rotaviruses with 23.6±2.1%.

All 3 intestinal viruses, group A rotavirus, serotype 40/41 adenoviruses and noroviruses, identified during mixed viral intestinal infection in which 3 viral associations were found in children, were recorded in 22 people together - 5.4±1.1%.

Conclusion

1. The maximum detection level of intestinal infection with norovirus is noted in the 1-3 age group, which is 35.4±3.0%. The incidence of norovirus intestinal infection was higher among boys (56.1±3.2%) than among girls (43.9±3.2%). Intestinal infection with norovirus was observed more in the spring season (46.7±3.2%), less in the autumn season (11.4±2.0%). During norovirus intestinal infection, the period of the epidemic process seems to consist of 2 high and one low amplitude cycles with the epidemic rise and fall of the incidence recorded in almost all seasons of the year.
2. In 2018, between 2 virus associations, RV±NV – 8.5%, AdV+NV – 6.8% and RV+AdV – 10.2% at random, 3 virus associations RV+AdV+NV 6.8% determined at random. In 2019, between 2 virus associations, RV+NV – 5.5%, AdV+NV – 20.8% and RV+AdV – 8.2% were recorded. 3 viral association RV+AdV+NV – confirmed in 5.1% cases. In 2020, between 2 virus associations, RV+NV – 15.3%, AdV+NV – 23.7% and RV+AdV – 8.5% were detected by chance. 3 viral associations were identified as RV+AdV+NV – 5.1%.

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