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HEPATITIS A EPIDEMIC (PAST AND PRESENT)

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Abstract

The intensity of hepatitis A epidemic process in the world varies significantly, and its incidence rate correlates with the sanitary-hygienic condition of individual territories. HA continues to be relevant due to the widespread, multifactorial conditions of transmission in territories with different socio-economic levels of development, as well as due to co-infection with hepatitis B and / or C viruses and the development of severe clinical forms of the disease in adults. **The objective:** to make retrospective comparative study of the manifestations of hepatitis A epidemic process in historical aspect (30 years) and in the modern period. **Results.** It was established that HA epidemic process intensity in Odessa region in 1978-1987. corresponded to territories with high endemicity. After a 30-year period (2008-2017) the prevalence of HA corresponds to the characteristics of territories with low endemicity which is confirmed by seroprevalence analysis of the population. The results of serological studies indicate that children under 10 years old have anti-HAV IgG in 22.26% of cases, the general group under 15 years old - in 20.31%, among adults under 30 years old - in 33.33 %, so in these days natural immunization occurs more often after 14 years. Among people over 30 years of age, seroprevalence for HAV reaches 86.25%. The issue of immunization of children at the local level according to epidemic indications and adults at risk can be considered in the area under study.

Key words: hepatitis A; seroprevalence; endemic process; historical process.

Urgency. The official nomenclature of viral hepatitis was approved by the scientific team of the WHO Hepatitis Committee in 1973 [1]. Hepatitis A virus (HAV) has been identified by Feinstone et al. in the same year, it is non-enveloped, spherical RNA-containing virus of 27-28 nm in size. It is highly virulent, with an extremely low infectious dose - from 100 to 1000 viral particles. In most cases the disease proceeds in asymptomatic forms, which resulted in formation of less intense immunity than in the presence of clinically pronounced manifestations. A reliable indicator of the hepatitis A (HA) epidemic process (EP) manifestation in the territory is the population's specific immunostructure [2, 3].

The intensity of HA EP in the world varies significantly, due to the uneven distribution across continents and countries. Regions with high (Asia, Africa), medium (Southern and Eastern Europe) and low (Scandinavia, Central Europe, North America) HAV circulation are conditionally distinguished. HA incidence rate correlates with the sanitary-hygienic condition of individual territories [4].

According to ECDC data, from October 1, 2012 to July 5, 2013, 103 cases of HAV infection were registered in Denmark, Finland, Norway and Sweden, 59 cases were confirmed by laboratory tests (subgenotype 1B with two similar sequences was isolated). During the outbreak investigation, it was found that within the incubation period, none of the patients left the European Union, the source of infection was not established, but frozen strawberries are indicated as a probable transmission factor [5].

Currently, in the global plan, HA continues to be relevant due to the widespread, multifactorial conditions of transmission in territories with different socio-economic levels of development, as well as due to co-infection with hepatitis B and / or C viruses and the development of severe clinical forms of the disease in adults.

The objective: to make retrospective comparative study of the manifestations of hepatitis A epidemic process in historical aspect (30 years) and in the modern period.

Materials and methods: as research materials the forms of medical statistical reporting (066 / y), reports of the State Institution "Laboratory Center of the Ministry of Health of Ukraine in Odessa Region" for 2008-2017 and archival data on the incidence of hepatitis A for the period 1978-1987, kindly provided by the same organization, were used.

A study of Odessa region population seroprevalence was carried out in 2015 by the virology laboratory of KU "Odessa Municipal Infectious Diseases Hospital". Retrospective epidemiological analysis, descriptive-analytical, serological and statistical methods were used.

Results and discussion. We conducted a comparative epidemiological study of HA EP over two periods: 1978-1987 and 2008-2017, with a 30-year time period. A historical view of the problem is of particular scientific interest.

In the study of quantitative and qualitative manifestations of HA EP in 1978-1987 the level of its intensity was established with its higher prevalence in the Odessa region than in the city ($t = 3.52$; $p = 0.007$) and amounted to 216.05 ± 33.44 and 183.10 ± 33.08 per population's 100 thousand, respectively (Table. 1). In the next period under analysis (2008-2017), on the contrary, there is a low prevalence of GA with the indicators 7.43 ± 2.62 and 4.02 ± 0.89 ($t = -1.88$; $p > 0.05$), without significant differences recorded in the region and city (fig. 1).

Thus, after a 30-year period in the territory with a high level of HA EP intensity, its significant decrease occurred in the region ($t = 6.37$; $p > 0.0001$) and the city ($t = 5.63$; $p < 0.001$). This can be explained by the improvement of the communal condition of the water supply and sewage systems, the higher quality of water treatment and the era of disposable tableware, which is used in public catering facilities for eating and drinking.

Table 1.

The incidence of hepatitis A in Odessa and Odessa Region in 1978-1987 and 2008-2017

Year	HA morbidity rate per 100 000			year	HA morbidity rate per 100 000		
	Odessa	Odessa Region	HA proportion in the structure of acute heps (region),%		Odessa	Odessa Region	HA proportion in the structure of acute heps (region),%
1978	101,72	143,71	80,99	2008	7,50	10,57	52,44
1979	134,40	191,02	80,35	2009	2,21	5,26	40,73
1980	166,74	238,03	82,58	2010	5,23	5,86	47,08
1981	201,33	233,08	83,70	2011	3,44	3,18	35,38
1982	383,41	364,92	91,37	2012	1,15	2,16	35,66
1983	337,82	412,92	90,08	2013	2,42	4,82	55,98
1984	158,84	184,93	82,76	2014	1,84	1,78	35,59
1985	100,57	119,75	74,42	2015	1,49	1,39	25,00
1986	109,32	135,12	70,98	2016	6,44	11,98	76,41
1987	136,82	136,98	72,48	2017	8,46	27,31	88,48
Total, M±m	183,10± 33,08	216,05± 33,44	80,97± 2,28	Total, M±m	4,02± 0,89	7,43± 2,62	49,28± 6,63

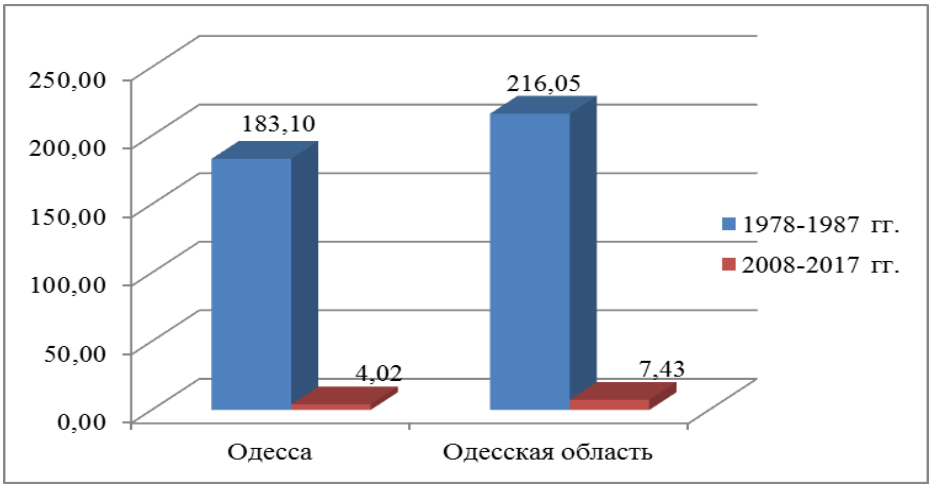

Fig. 1. The incidence of HA in (M) in the city of Odessa and Odessa region in 1978-1987 and 2008-2017

At the same time, when comparing the qualitative manifestations of EP, it was found that despite a clear decrease in intensity, age-related incidence did not undergo significant changes. Thus, the overall incidence rate among children, both in the first and second compared periods, is significantly higher than among adults. In 1978-1987 group under 14 years old was up to 392.15 ± 78.82 cases and among adults - 108.45 ± 9.15 ($t = 3.92$; $p < 0.05$), in 2008-2017 it was up to 21.04 ± 6.57 and 5.19 ± 1.52 ($t = 3.23$; $p < 0.05$), retrospectively (Tables 2, 3, Fig. 2).

Table 2.

Age structure of the incidence of GA in the period 1978-1987

year	HA morbidity rate in Odessa per 100 000						
	children, year class, years					Adults	Total population
	Kids	1-2	3-6	7-14	total		
1978	0	29,11	1627,81	680,64	190,21	156,03	101,72
1979	8,31	25,03	506,82	526,90	254,43	124,69	134,40
1980	0	33,32	186,14	317,81	346,80	75,11	166,74
1981	16,50	94,84	354,59	373,42	429,03	109,62	201,33
1982	8,52	173,91	560,02	374,20	796,11	124,20	383,41
1983	8,84	217,43	689,63	451,39	837,74	134,64	337,82
1984	18,52	80,02	433,32	374,74	334,72	114,02	158,84
1985	18,48	63,59	280,42	208,82	200,11	74,69	100,57
1986	0	41,82	271,59	240,92	209,33	83,12	109,32
1987	19,82	320,71	528,32	258,30	323,02	88,41	136,82
M±m	9,90± 2,70	107,98± 32,88	543,87± 136,88	380,71± 47,72	392,15± 78,82	108,45± 9,15	183,10± 33,08

Table 3.

Age structure of HA incidence in 2008-2017

year	HA mortality rate in Odessa per 100 000							
	Children, year class, years						Adults	Total population
	kids 1	1-4	5-9	10-14	15-17	Total		
2008	0,00	20,35	25,74	22,37	-	21,10	8,43	10,57
2009	0,00	5,36	11,80	10,24	-	9,95	4,32	5,26
2010	0,00	4,16	7,44	11,01	20,35	28,19	4,95	5,86
2011	0,00	0,98	3,67	3,69	5,36	17,71	3,21	3,18
2012	0,00	1,95	6,42	4,61	2,68	13,46	1,81	2,16
2013	0,00	3,78	14,79	26,91	14,63	14,06	2,81	4,82
2014	0,00	2,87	2,63	2,87	7,98	3,31	1,39	1,78
2015	0,00	0,00	2,43	2,74	2,47	1,77	1,31	1,39
2016	7,34	11,06	23,98	49,01	59,32	30,55	7,59	11,98
2017	3,67	17,86	69,76	108,01	133,08	70,34	16,11	27,31
M±m	1,10± 0,83	6,84± 2,39	16,87± 6,80	24,15± 10,97	30,73± 17,15	21,04± 6,57	5,19± 1,52	7,43± 2,62

Note: - no data, since 2010, the nomenclature of the registration of the incidence rate for children's age groups has changed.

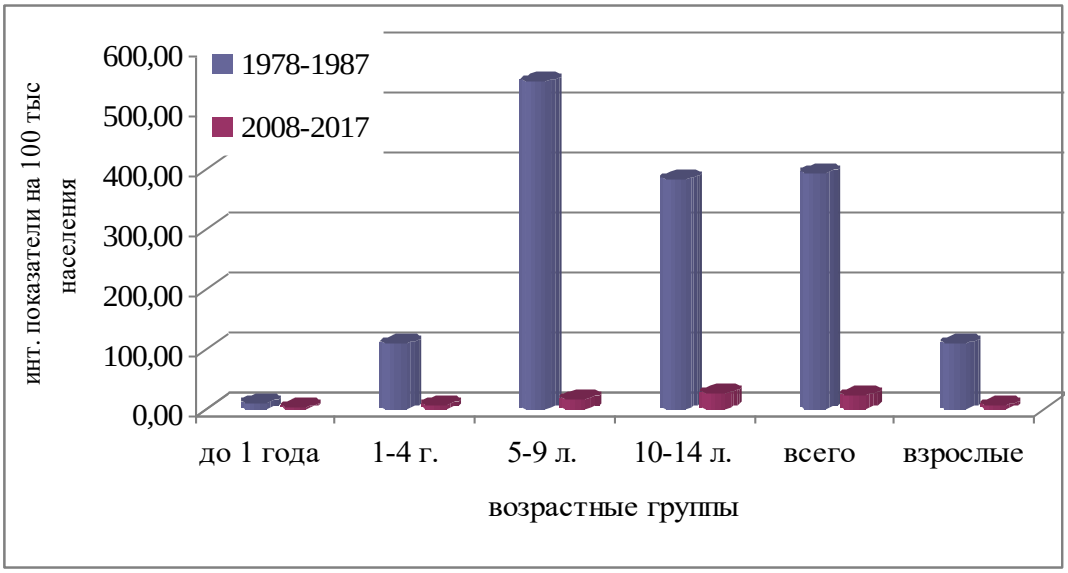

Fig. 2. Dynamics of age-related incidence of HA (M) in Odessa region in 1978-1987 and 2008-2017.

An analysis of the incidence among children's age groups showed that in the first period, 3-6-year-old children were significantly more likely to have HA: 543.87 ± 136.88, versus 9.90 ± 2.70 among kids ($t = 4.09$; $p < 0.05$); 107.98 ± 32.88 - in the group of 1-2 years

old children (t = 3.25; p <0.001) and 380.71 ± 47.72 among 7-14 year old (t = 1.71; p> 0.05) persons.

In the second period under analysis 15-17-year-old adolescents were unreliable, but on average several times more often: 30.73 ± 17.15, versus 1.10 ± 0.83 in the group of kids (t = 1.91; p> 0.05), 6.84 ± 2.39 among 1- 4 year olds (t = 1.82; p = 0.11), 16.87 ± 6.80 among children of 5-9 years old (t = 1.74; p = 0.13), 24.15 ± 10.97 in the group of 10-14 year olds (t = 1.20; p = 0.27).

According to the analysis of medical forms 066 / y, it was found that the average age of affected adults was 34.5 ± 3.5 years.

Thus, over the compared periods, the incidence of HA was significantly more often recorded among children than among adults. It was noted that in the first period, children of 3–6 years old were significantly more likely to get sick ; in the second, a tendency toward a higher incidence rate among 15–17-year-olds was established.

It can be stated that in the second period under investigation introduction of infection occurs much later, which is confirmed by the results of Odessa region population seroprevelance analysis to HAV (anti-HAV IgG) conducted in 2015 (Table 4). 186 persons were examined; anti-HAV IgG was detected in 96 (51.61%) of them, including 13 children from 1 to 15 years old (20.31%) and 83 adults (68.03%).

Table 4

Seroprevalence of the inhabitants of the Odessa region to the CAA in 2015

Age groups	N of examined	N of seroprevalent persons	Proportion, %
1-4	22	5	22,73
5-10	21	5	23,81
Total, up to 10 y.o.	43	10	22,26
11-14	21	3	14,29
Total, up to 15 y.o.	64	13	20,31
15-18	20	6	30,00
19-29	22	8	36,36
Adult, up to 30 y.o.	42	14	33,33
30-39	20	16	80,00
40-49	20	15	75,00
50-59	20	19	95,00
60-79	20	19	95,0
Over 30 y.o.	80	69	86,25
Total, adult	122	83	68,03
Total examined	186	96	51,61

When study the various age groups persons seroprevalence, it was found that children under 10 years old had anti-HAV IgG in 22.26% of cases, up to 15 years old - in 20.31%, among adults under 30 years old it was met in 33.33%. So, according to the values of seroprevalence of different age groups in Odessa region the latter can be placed into a category of territories with low level of HA endemicity. However, it should be noted that with age among the adults living in the specified territory, the level of immunization approaches 100 %. In the group of people over 30 y.o. anti-HAV IgG was detected in 86.25%.

When study the annual dynamics of HA incidence during the compared periods, it was found that HA cases were recorded throughout the year. However, the seasonal rise (SR) in the first period began in September and gradually declined by December, that is, it had an autumn-winter character, while during the second period, two SRs were observed in January-February and from August to October, having summer-autumn-winter character (Fig. 3).

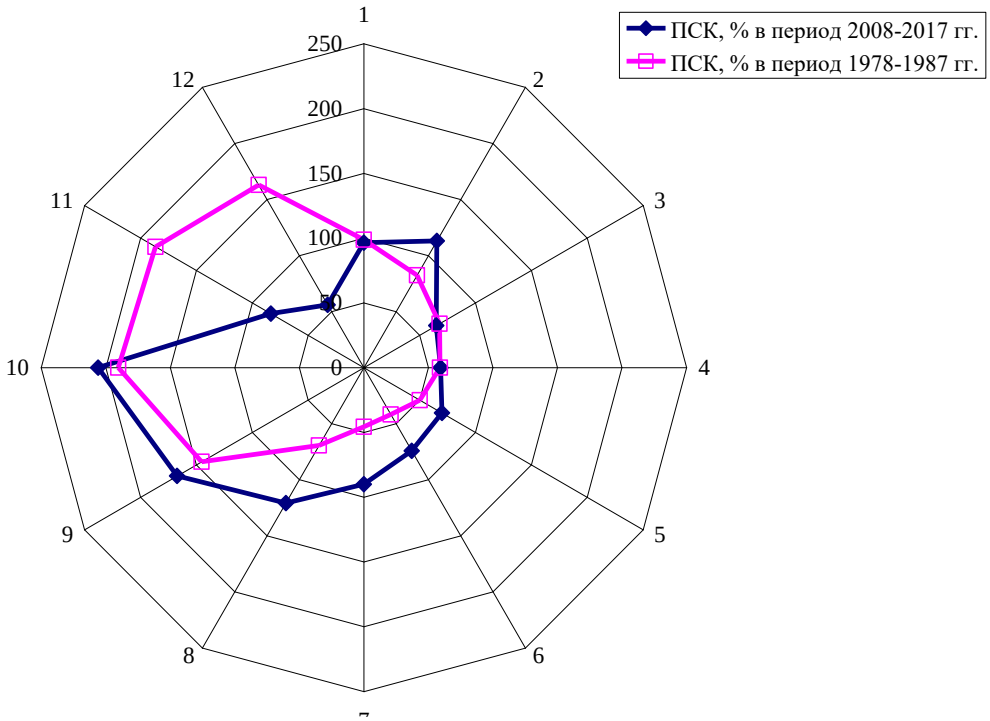

Fig. 3. The annual dynamics of HA incidence (seasonal fluctuations, %) in the Odessa region during 1978-1987 and 2008-2017.

During 2008-2017 there was a smoothing out of seasonal factors and a more uniform distribution of the incidence rate during the year against the background of a decrease in the intensity of HA EP.

Findings

According to WHO resolution, as part of the "Global Health Sector Strategy for Viral Hepatitis 2016–2021" countries with medium endemic HA will benefit most from universal immunization of children. Countries with low endemicity may include adults at risk vaccination. In high endemicity countries vaccine use is limited, as most adults have natural immunity. As of June 2016, 16 countries used HA vaccine as part of routine immunization of children at the national level. In some countries, the vaccine is also recommended for people at increased risk of infection, which include: consumers of recreational drugs; travelers to places with widely circulated viruses; homosexuals, chronic liver diseases patients (due to the increased risk of developing serious complications in the case of HA).

Conclusions

1. It was established that HA epidemic process intensity in Odessa region in 1978-1987. corresponded to territories with high endemicity. After a 30-year period, in 2008-2017. the prevalence of HA corresponds to the characteristics of territories with low endemicity, which is confirmed not only by the level of recorded incidence but also by the results of seroprevalence of the population to HAV.

2. The results of serological studies indicate that children under 10 years old have anti-HAV IgG in 22.26% of cases, the general group under 15 years old - in 20.31%, among adults under 30 years old - in 33.33 %, so in the present period natural immunization occurs more often after 14 years.

3. Among people over 30 years of age, seroprevalence for HAV reaches 86.25%, which indicates a high level of collective immunity to HAV.

4. In accordance with WHO resolution, the issue of immunization of children at the local level according to epidemic indications and adults at risk can be considered in the area under study.

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