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MENINGITIS AND ENCEPHALITIS IN POLAND IN 2012

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ABSTRACT

AIM OF THE STUDY. The aim of this study was to assess the epidemiology of meningitis and/or encephalitis in Poland in 2012.
INTRODUCTION. About 2 500-3 000 cases of meningitis and/or encephalitis of viral or bacterial etiology are recorded in Poland every year.
MATERIALS AND METHODS. Assessment of the epidemiological situation of meningitis and/or encephalitis in Poland in 2012, was based on the results of analysis of epidemiological reports sent to the NIZP-PZH by the Regional Sanitary-Epidemiological Stations published in the annual bulletin "Infectious diseases and poisonings in Poland in 2012" and "Preventive immunizations in Poland in 2012" (Czarkowski MP. et al., Warsaw, 2013, NIZP-PZH, GIS).
RESULTS. In 2012 in Poland 3 088 cases of meningitis and/or encephalitis were recorded. More than 50% of these were viral infections.
SUMMARY AND CONCLUSIONS. The epidemiological situation of inflammatory meningitis and encephalitis in Poland in 2012 compared to 2011 did not change significantly.

Keywords: *meningitis, encephalitis, epidemiology, Poland, 2012*

THE AIM OF THE STUDY

The aim of this study was to assess the epidemiology of meningitis and/or encephalitis in Poland in 2012 and compare it to the situation in previous years.

INTRODUCTION

About 2 500-3 000 cases of meningitis and/or encephalitis and/or aseptic are registered in Poland every year. While inflammation of the brain is the most common form of diseases of the central nervous system (CNS), bacterial meningitis is believed to be the most severe of all neuroinfections.

Among the confirmed cases of bacterial meningitis *Neisseria meningitidis* and *Streptococcus pneumoniae* are the dominant etiological agents. Tick-borne encephalitis is the most common type of viral neuroinfections.

MATERIALS AND METHODS

Assessment of the epidemiological situation of meningitis and/or encephalitis in Poland in 2012, was based on analysis of epidemiological interviews sent to the NIZP-PZH by the Regional Sanitary-Epidemiological Stations published in the annual bulletin "Infectious diseases and poisonings in Poland in 2012" and in the bulletin "Preventive Vaccinations in Poland in 2012" (Czarkowski MP et al., Warsaw, 2013, NIZP-PZH and GIS). Definitions of cases used in surveillance were based on the document "Definitions of cases of communicable diseases developed for epidemiological surveillance used in the years 2009-2011" (Department of Epidemiology, NIZP-PZH) and the data from the "Immunization Program for the year 2012" (Annex to the Statement of the Chief Sanitary Inspector from 26 Oct. 2011).

Table I. Meningitis and encephalitis in Poland in 2009-2012 by etiological agent. Number of cases and incidence per 100 000 population.

Etiological agent	median 2004-2008		Meningitis and encephalitis							
	number of cases	incidence rate	2009		2010		2011		2012	
			no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate
Neisseria meningitidis	148	0.39	190	0.5	146	0.38	193	0.5	165	0.43
Haemophilus influenzae	39	0.10	13	0.03	11	0.03	11	0.03	11	0.03
Streptococcus pneumoniae	119	0.31	163	0.43	180	0.47	192	0.5	145	0.38
bacterial specified	161	0.42	127	0.33	148	0.39	139	0.36	128	0.33
bacterial unspecified	512	1.34	372	0.98	361	0.95	353	0.92	310	0.80
viral specified*	308	0.81	412	1.08	371	0.98	284	0.74	344	0.89
viral unspecified	1215	3.18	832	2.18	1248	3.26	1154	3.01	1271	3.30
postvaccinal	1	0.00	0	0.00	0	0.00	0	0.00	0	0.00
other and unspecified	374	0.98	408	1.07	598	1.57	589	1.53	714	1.85
total	2877	7.53	2517	6.6	3063	8.03	2915	7.59	3088	8.01

including encephalitis transmitted by ticks

Source: National Institute of Health - Department of Epidemiology, Chief Sanitary Inspectorate - Department of Communicable Diseases and Health Education. Infectious diseases and poisonings in Poland in 2012, Warsaw, 2013. Interviews epidemiological SES, the development of the NIH.

RESULTS

In 2012 in Poland 3 088 cases of meningitis and/or encephalitis were recorded (incidence 8,01/100,000 people), which is higher by 5,6% compared to 2011 (Tab.I). Meningitis cases constitute 65,64% of all disease cases. Viral infections were the cause of 52,3% of all registered neuroinfections. Among all viral neuroinfections, the most common was tick-borne encephalitis (54,94%).

MENINGITIS AND ENCEPHALITIS OF BACTERIAL ETIOLOGY

In 2012 in Poland 759 cases of bacterial meningitis and/or encephalitis were recorded (Tab.II). This is less by 14,53% then in the previous year. Cases of disease occurred in all regions of the country.

The highest number of cases was recorded in Śląskie – 128 cases (2,77/100 000 people), the lowest number in Opolskie province - 19 (1.87/100 000). (Tab. II). In 2012 incidence rate was the highest in Warminsko-mazurskie province -3,17/100 000 people, and the lowest rate in Lubelskie – 1,52/100 000 people (Tab. II).

In 2012, as in 2011, the incidence rate among men (2.46/100 000) was higher than the incidence rate among women (1.57/100 000). Incidence rate in rural areas (2.26/100 000) was higher than in the urban areas (1.92/100 000). (tab. III).

The highest incidence rate was recorded in the group of children under 4 years of age (8.38/100 000), with the observed decrease over the past two years: a drop by 14,78% and 20,64% for the years 2011 and 2010 respectively. As in 2011, the lowest incidence rate was recorded in the group 25-44 years of age – 1,03/100 000 people (Tab. IV)

Out of 759 cases of bacterial meningitis the etiologic agent was determined in 321 (42,29 %) cases. In this group meningococcal and pneumococcal infection constitute 96.87%. Among children and adolescents up to 19 years dominated disease etiology was *N.meningitidis* (102 cases, 61.8% of meningococcal total cases). More than 50% of pneumococcal infections were recorded in people over 45 years (77 cases, 53.1% of pneumococcal total cases) (Tab.IV).

Neisseria meningitidis. In 2012, the number of recorded cases of this etiology was 165 (incidence rate 0,43/100 000 people). Compared to 2011 (193 cases) it is a decrease of 14,5%. The highest number of disease cases - 23 was observed in Mazowieckie province (incidence rate 0.43/100 000). The lowest number -3 was in two provices: Opolskie and Podlaskie (incidence rate 0,3 and 0,25 per /100 000). The highest incidence rate was in Pomorskie province (0.57 per /100 000) and the lowest (0.24 per /100 000) in Łódzkie province (Tab. II). Most cases of meningococcal meningitis and/or encephalitis occurred in winter and summer: January (11,3%), February (11,3%), May (13,1%) and June (10%).

Serological group of *N. meningitidis* was identified in 127 cases (76,97%)). The most frequently isolated serogroup was type B (41,21%), Serogroup C was detected in in 54 cases (32,72%) and serogoup W135 in 5 cases. For 30 cases serotype was not determined (18,18%).

The analysis of epidemiological data indicate a noticeable increase of infections caused by *N. meningitidis* serogroup C since 2002. It is an important information

Table II. Meningitis and encephalitis in Poland in 2012. Number of cases and incidence per 100 000 population by etiological agent and province

Province	Bacterial meningitis and encephalitis										Viral meningitis and encephalitis*				Meningitis and encephalitis: specified and unspecified	
	Neisseria meningitidis		*Haemophilus influenzae*		*Streptococcus pneumoniae*		specified and unspecified		total		specified and unspecified		tick-borne encephalitis			
	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate	no of cases	inc. rate
POLAND	165	0.43	11	0.03	145	0.38	438	1.14	759	1.97	1426	3.70	189	0.49	714	1.85
1. Dolnośląskie	15	0.51	1	0.03	12	0.41	17	0.58	45	1.54	70	2.40	12	0.41	34	1.17
2. Kujawsko-pomorskie	5	0.24	1	0.05	5	0.24	27	1.29	38	1.81	65	3.10	0	0.00	24	1.14
3. Lubelskie	6	0.28	1	0.05	4	0.18	22	1.01	33	1.52	63	2.90	1	0.05	22	1.01
4. Lubuskie	4	0.39	0	0.00	5	0.49	14	1.37	23	2.25	16	1.56	0	0.00	2	0.20
5. Łódzkie	6	0.24	1	0.04	10	0.39	30	1.18	47	1.86	90	3.55	2	0.08	30	1.18
6. Małopolskie	18	0.54	0	0.00	12	0.36	30	0.90	60	1.79	127	3.79	2	0.06	82	2.45
7. Mazowieckie	23	0.44	0	0.00	25	0.47	43	0.81	91	1.72	198	3.75	15	0.28	87	1.65
8. Opolskie	3	0.30	0	0.00	2	0.20	14	1.38	19	1.87	61	6.02	9	0.89	28	2.76
9. Podkarpackie	10	0.47	1	0.05	7	0.33	31	1.46	49	2.30	93	4.37	1	0.05	74	3.48
10. Podlaskie	3	0.25	1	0.08	3	0.25	23	1.92	30	2.50	37	3.08	105	8.75	44	3.66
11. Pomorskie	13	0.57	0	0.00	9	0.39	30	1.31	52	2.28	101	4.42	0	0.00	23	1.01
12. Śląskie	18	0.39	3	0.06	30	0.65	77	1.66	128	2.77	88	1.90	1	0.02	111	2.40
13. Świętokrzyskie	7	0.55	0	0.00	2	0.16	16	1.25	25	1.96	29	2.27	1	0.08	16	1.25
14. Warmińsko-mazurskie	6	0.41	2	0.14	9	0.62	29	2.00	46	3.17	254	17.49	35	2.41	49	3.37
15. Wielkopolskie	18	0.52	0	0.00	5	0.14	19	0.55	42	1.22	87	2.52	4	0.12	70	2.03
16. Zachodniopomorskie	9	0.52	1	0.06	5	0.29	16	0.93	31	1.80	90	5.22	1	0.06	18	1.04

neuroinfections viral excluding TBE

Source: National Institute of Health - Department of Epidemiology, Chief Sanitary Inspectorate - Department of Communicable Diseases and Health Education. Infectious diseases and poisonings in Poland in 2012, Warsaw, 2013. Interviews epidemiological SES, the development of the NIH.

from a public health perspective, because meningococcal infections of group C are the etiological factor in outbreaks and epidemics (Tab. V). In 2012, 46,810 people were vaccinated against *N. meningitidis*, which is less by 34,96% than in the previous year (71 981 people). The majority of vaccinated individuals were children and young people up to 19 years of age (93.16% of the total).

In Poland, two types of vaccines against *N. meningitidis* are available. monovalent C, and quadrivalent A+C Y +W135.According to the Immunization Program in 2012, vaccination against *N. meningitidis* was mandatory and can be used from 2 moths of age.

Haemophilus influenzae type B. Since 2010 the number of disease casas caused by Haemophilus Influenzae type B is relatively low. Registered cases occurred in 8 provinces. The highest number of cases was recorded in Śląskie province 3 (0,06/100 000) and the lowest number in Warmińsko-Mazurskie province (0.14/100 000) (Tab. II). A total of 81,8% disease cases was reported among people > 30 years of age, of which 89,9% were individuals living in urban areas. Vaccination against *H. influenzae* type B had been introduced as mandatory vaccination in 2007 for children below 2 years of age. According to the National Vaccination Program in 2012 full vaccination course includes doses

Table III. Meningitis and encephalitis in Poland in 2011-2012 - incidence per 100 000 population by gender and surroundings

Diagnosis	Year	Total	Gender		Surroundings	
			male	female	town	village
Bacterial meningitis and encephalitis	2011	2.30	2.90	1.75	2.33	2.26
	2012	1.97	2.46	1.51	1.92	2.05
Viral meningitis and encephalitis*	2011	3.16	2.95	3.35	3.16	3.16
	2012	3.70	4.39	3.05	3.61	3.84
Tick-borne encephalitis	2011	0.57	0.73	0.43	0.41	0.82
	2012	0.49	0.62	0.37	0.40	0.63

neuroinfections except aseptic TBE

Source: National Institute of Health - Department of Epidemiology, Chief Sanitary Inspectorate - Department of Communicable Diseases and Health Education. Infectious diseases and poisonings in Poland in 2012, Warsaw, 2013. Interviews epidemiological SES, the development of the NIH.

Table IV. Meningitis and encephalitis in Poland in 2012. Number of cases and incidence per 100 000 population by etiology and age group

Eiological agent		Age group								
		0-4	5-9	10-14	15-19	20-24	25-44	45-64	65 i >	razem
Neisseria meningitidis		69	7	9	17	13	29	15	6	165
Haemophilus influenzae		1	1	0	0	0	4	1	4	11
Streptococcus pneumoniae		28	7	4	5	2	22	52	25	145
Other bacterial specified and unspecified		75	22	15	40	27	65	128	66	438
Bacterial total	number	173	37	28	62	42	120	196	101	759
	inc. rate	8,38	2,01	1,47	2,74	1,54	1,03	1,85	1,87	1,97
Viral specified and unspecified		79	145	159	198	194	395	166	90	1426
Tick-borne encephalitis		1	2	4	8	15	53	82	24	189

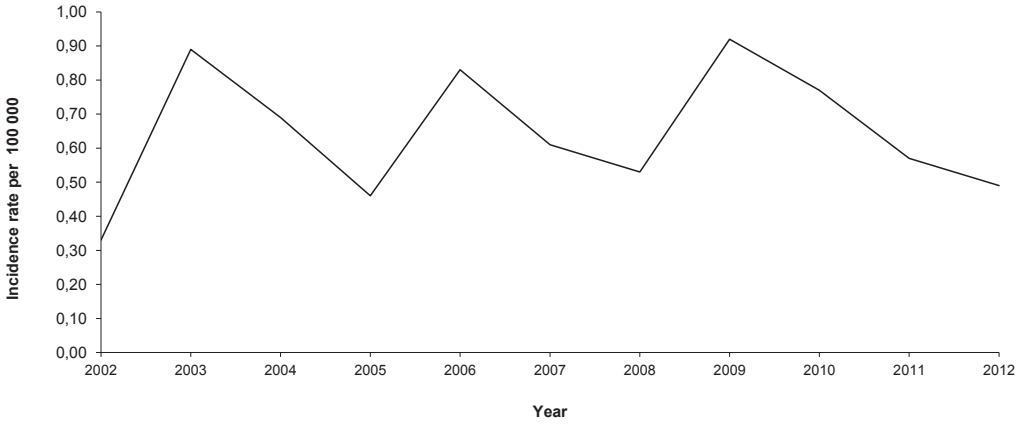
Source: National Institute of Health - Department of Epidemiology, Chief Sanitary Inspectorate - Department of Communicable Diseases and Health Education. Infectious diseases and poisonings in Poland in 2012, Warsaw, 2013. Interviews epidemiological SES, the development of the NIH.

at 2, 4 and 6 months of age (primary vaccination) and one booster dose given at 2 years of age. The number of people vaccinated against *H. influenzae type B* remains high. In 2012, between 97,9% and 99,8% of children under 2 years of age were vaccinated against *H. influenzae type B*.

Streptococcus pneumoniae. In 2012, 145 cases of meningitis and /or encephalitis caused by *S. pneumoniae* were recorded (incidence rate 0,38/100 000), and was less by 24,5% in comparison to 2011 (192 cases) (Tab. I). The highest number of cases was recorded in Śląskie province (20,7%, incidence rate 0,65/100 000). The lowest incidence rate was noted in the following provinces: Wielkopolskie, Świętokrzyskie and Lubelskie (0,14/100 000, 0,16/100 000 and 0.18/100 000. As in years 2010-2011, people over 25 years of age accounted for the majority of cases (68,3%). Cases in the age group 0-4 years amounted to 19,3% (1.36/100 000) (Tab. IV). Meningitis and/or encephalitis caused by *S. pneumoniae* occurred in all provinces, according to the National Immunization Program in 2012, vaccination against *S. pneumoniae* was mandatory only for babies age 2 months -5years of age within high-risk groups with specific medical indications. However, it was recommended for people over 65 years of age, children up to 5 years of age in others groups at-risk and adults at risk.In 2012, in Poland 190 127 people were vaccinated against *S. pneumonia* which is higher than in the previous years . Predominated among those vaccinated were children under 14 years of age - (91.1%).

Table V. Serotypes of *Neisseria meningitidis* in 1993-2012 in Poland

Year	*Neisseria meningitidis* number		Confirm serotypes (%)	Serotypes of *Neisseria meningitidis*					
	of cases	serotypes		A*	B	C	D	other	mixed
1993	168	13	7,73	-	10 (77%)	3 (23%)	-	-	-
1994	163	37	22,7	5	24 (65%)	8 (22%)	-	-	-
1995	151	49	32,5	2	38 (78%)	8 (16%)	1	-	-
1996	144	43	29,9	3	30 70%)	10 (23%)	-	-	-
1997	140	51	36,4	-	40 (78%)	9 (18%)	-	2	-
1998	129	54	41,9	-	47 (87%)	5 (9%)	-	2	-
1999	121	47	38,8	1	40 (85%)	5 (11%)	-	1	-
2000	110	39	35,5	-	32 (82%)	7 (18%)	-	-	-
2001	100	25	25,0	2	16 (64%)	7 (28%)	-	-	-
2002	90	22	24,4	2	13 (59%)	7 (32%)	-	-	-
2003	76	39	51,3	3	20 (51%)	14 (36%)	-	2	-
2004	119	69	58,0	6	41 (59%)	19 (27%)	-	3	-
2005	135	77	57,0	2	37 (48%)	35 (45%)	-	3	-
2006	148	83	56,1	2	35 (42%)	41 (49%)	-	5	-
2007	224	170	76,0	1	77 (46%)	80 (48%)	-	6	6
2008	220	186	85,0	1	87 (46%)	89 (47%)	-	1	8
2009	190	164	86,3	2	79 (48%)	74 (45%)	-	4	5
2010	146	129	88,4	-	67 (52%)	56 (43%)	-	5	1
2011	193	154	79,1	-	89 (46%)	62 (32%)	-	3	-
2012	165								

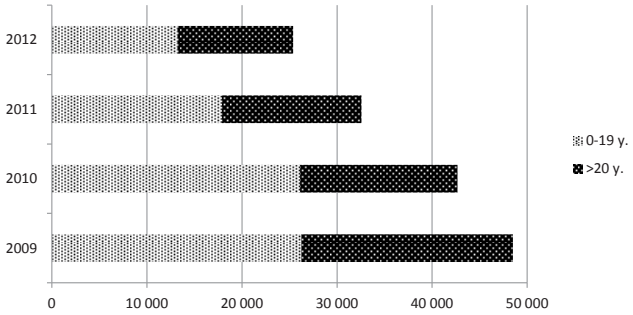


Suorce: NIPH-NIH - Epidemiology Department Main Sanitary Inspectorate.

Fig. 1. Tick-borne encephalitis, Poland, 2002-2012. Incidence per 100 000 population

MENINGITIS AND ENCEPHALITIS OF VIRAL ETIOLOGY

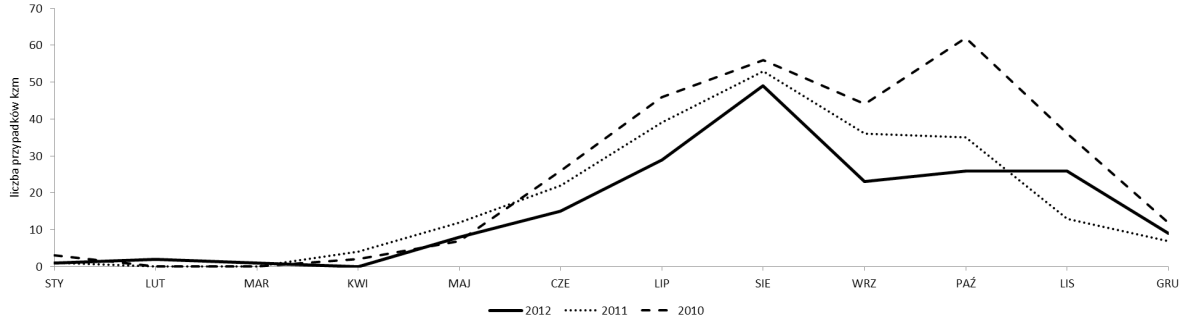
In 2012 there was an increase in the number of viral neuroinfections by 12.3% compared to 2011 (Tab. II). Total number of registered cases was 1615 (incidence 4.19/100 000) and constituted 21,31% of all neuroinfections (344 cases). Of these: 54,94% were cases of encephalitis transmitted by ticks. The highest incidence rate of viral neuroinfections was reported in Warmińsko-Mazurskie (19,9/100 000) and Podlaskie (11,83/100 000). The incidence in rural areas (4,47/100 000) was higher than in urban areas (4,01/100 000). (Tab. III). ***Tick-borne encephalitis* (TBE).** In 2012, there were 189 recorded cases of encephalitis transmitted by ticks reported in 13 of 16 provinces - the incidence rate was 0.49/100 000. In comparison to the previous year it was a decrease by 32 cases (14,5%). The highest number of cases was observed in Podlaskie province (55,5%) (8.75/100 000) and Warmińsko-Mazurskie (18,5% and 2,41/100 000) (Tab. II). The incidence rate in other provinces was reported to be lower than 1,0/100 000 people (Fig.1). The age of patients was in the range of 4 to 80 years (median, 48 years). There were 117 confirmed cases (62%) of tick-borne encephalitis, 69 probable cases (36,5%) and 3 possible cases (1,6%).



Ryc. 3. Number of persons by age, which in the years 2009 - 2012 were given a dose of a vaccine against TBE--ending cycle of primary vaccination or booster dose.

More cases occurred in men (61.4%). Seasonality was typical for TBE, i.e. the period of occurrence from May to November, with the highest number of cases registered from July to September (Fig. 2) which is comparable to the situation in the previous year.

According to the Immunization Program in 2012, vaccination against TBE is recommended to people living in or traveling to endemic areas and profes-



Source: Questionnaires of cases sent to NIPH-NIH by the Voivodeship Sanitary and Epidemiological Stations

Fig.2. Seasonal distribution of tick-borne encephalitis in Poland in 2010-2013.

sional groups of increased risk of infection. Vaccination scheme includes an inactivated vaccine in the series 0-3-12 months and a booster dose every 3-5 years. Status of vaccination against TBE in Poland remains low. In 2012 the number of people vaccinated was estimated to be 25 388, which is lower by 7 173 in comparison to 2011 (Fig.3) . The highest number of people vaccinated was in Mazowieckie – 6262 , the lowest in Opolskie– 422 people.

SUMMARY AND CONCLUSIONS

In comparison to the previous year, the epidemiological situation of meningitis and/or encephalitis in Poland in 2012, has not changed significantly. The continuing downward trend in the incidence of TBE indicates the effectiveness conducted in 2009-2010 by the NIPH - NIH nationwide project entitled. „Active surveillance of viral neuroinfecions". In view of the fact that the group B of *N. meningitidis* is the most frequently serologically isolated strain, should be considered the introduction of vaccines for serogroup B to vaccination schedule.

Given the severe invasive disease should be postulated, although observable in recent years, growth in the number of people vaccinated against *S. pneumoniae*, the introduction of vaccination against invasive pneumococcal disease for all children.

Received: 04.04.2014
Accepted for publication: 08.04.2014

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