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Epidemiology of Parkinson's Disease in the Southern Ukraine

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Background: Parkinson's disease is a slowly progressing neurodegenerative disease with accumulation of alpha synuclein and the formation of Levy's intraneuronal bodies. The prevalence of PD ranges from 100 to 200 cases per 100,000 population, however, in reality in Ukraine, many cases of the disease remain undiagnosed, which affects the statistical indicators of disease burden.
Aim of the Study: Comparison of PD epidemiological indices in the Southern Ukraine versus all-Ukrainian rates.
Materials and Methods: Analysis of static data of the Ministry of Health of Ukraine, health departments of Odessa, Mykolaiv and Kherson regions for 2015-2017. There were used the methods of descriptive statistics and analysis of variance.
Results: Average prevalence of PD in the Ukraine is 67.5 per 100,000 population – it's close to the Eastern Europe rate. The highest prevalence was registered in Lviv (142.5 per 100000), Vinnytsia (135.9 per 100000), Cherkasy (108.6 per 100,000) and Kyiv (107.1 per 100,000) regions. The lowest prevalence rates were in the Luhansk (37.9 per 100,000), Kropivnitsky (42.5 per 100,000), Chernivtsi (49.0 per 100,000) and Ternopil (49,6 per 100,000) regions. In the Southern Ukraine the highest prevalence of PD was found in the Mykolayv region. The prevalence was higher in the urban area and in the districts located closely to the regional capital city. Based on the total population and demographic properties in Odesa, Mykolaiv and Kherson regions, it can be

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concluded that at least 40-50% of patients with PD are left outside the sphere of medical care, and in some areas of these regions this index is 80-90%.
Conclusion: To optimize the diagnostic process and standardize epidemiological data, it is necessary to intensify the work of centers of extrapyramidal diseases in all regions of Ukraine, including intra-center and inter-center information databases to obtain adequate and pertinent statistical data.

Keywords: Parkinson's disease; epidemiology; surveillance; health care.

1. INTRODUCTION

The number of reported cases of any nosology depends on many parameters: Its detectability, professional competence and qualification of specialists, their motivation, organizational and methodological activities in the regions, the establishment of specialized centers for the diagnosis and treatment of extrapyramidal diseases, the economic development, life expectancy, etc. [1].

Significant dispersion of prevalence, morbidity, dispensary records of patients with Parkinson's disease (PD) is associated with the features of the organization of medical care on the sites, the lack of a uniform method of registration for all neuropathologists, and therefore with insufficient detection of patients in this category [2,3].

PD is the second most frequent neurodegenerative disease after Alzheimer's [2,4,5,6]. According to Dorsey E., Bloem B. [4]), there are more than 6 million patients diagnosed with PD in the world, most of whom live in Europe and North America. According to the authors, the prevalence of PD in the world has increased 2.5 times in the last 20 years [4]. The cause of this phenomenon is not only the aging of the population, but also improved diagnostics. Fig. 1 shows the distribution of PD in the different countries.

According to various studies, the incidence rate for PD ranges from 5 to 25 per 100,000 population per year. With age, prevalence and morbidity rates are steadily increasing, among persons over 60 years the prevalence of PD reaches 1-2% and among persons over 80 years - 4% [7].

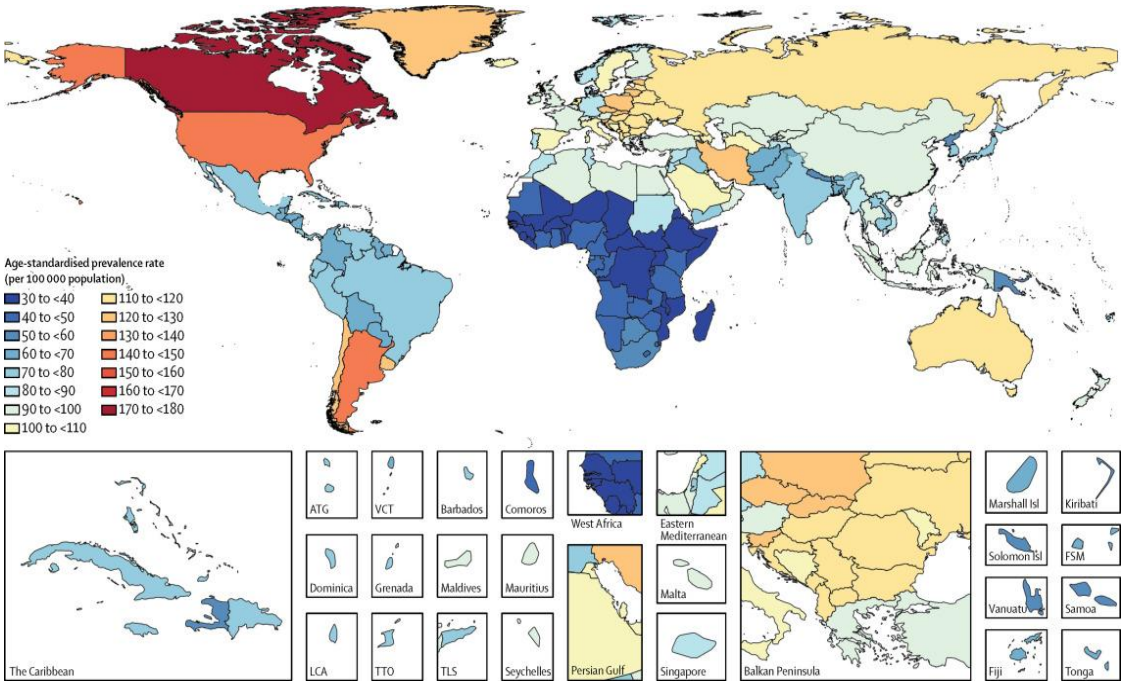

Fig. 1. Frequency of detection of PD in different countries of the world (Source: Dorsey and bloem 2018) [4]

The prevalence of PD varies from 15 cases per 100,000 population in China to 657 per 100,000 population in Argentina. In Europe and North America, this figure ranges from 100-250 cases per 100,000 population. In the USA, the highest values are recorded in the state of Nebraska - 329.3 cases per 100,000 population [5]. Among European countries, the high prevalence rate is characteristic of Albania (800/100000) and Italy, where in the province of Brescia the rate was 407 cases of PD per 100,000 population [4,5,8]. The lowest prevalence rate of PD is characteristic of developing countries - in Ethiopia this index is only 7 cases per 100,000 population, and in Central Africa - 20 cases per 100,000 population [8].

The incidence of PD varies greatly in different regions of the world and within individual countries. Thus, in China, the incidence of new cases of PD varies from 1.5 to 8.7 cases per 100,000 population. France has the highest incidence rates - 49.4 cases per 100,000 population, Argentina - 31.2 cases per 100,000 population, and Taiwan - 28 cases per 100,000 population and Italy - 23.1 cases per 100,000 population. The lowest incidence rates are typical for the Russian Federation - 9.0 per 100,000 population, India - 5.7 cases per 100,000 population, Libya - 4,5 cases per 100,000 population [8].

It is estimated that in various countries, given the current tendency to increase the prevalence associated with population aging and improve survival of patients with PD, the number of patients may reach 9 million by 2030 [4,7].

Epidemiological data on the prevalence of PD are interesting because they can potentially improve our understanding of the environmental impact on the development and course of the disease and identify possible risk factors. Also, these data may be useful and relevant for the formation of the correct structure of on-site health care delivery [1,9].

In Ukraine, in recent years, there has been an increase in the prevalence of PD, with the largest increase observed in Kiev and the region, as well as in Lviv, Chernihiv and Ivano-Frankivsk regions. The number of registered cases of PD decreased by 43.14% - 77.87% in the territories ofJoint Forces Operation. The highest prevalence rates of PD were noted in Vinnytsia (126.1 per 100000), Kyiv (111.6 per 100000), Lviv (109.5 per100000) and Cherkasy (90.0 per 100000) regions [10].

There are currently no scientifically substantiated and statistically reliable epidemiological data on the prevalence and incidence of PD and Parkinson's syndrome in the southern Ukraine.

1.1 Aim of the Study

Comparison of PD epidemiological indices in the southern Ukraine versus all-Ukrainian rates.

2. MATERIALS AND METHODS

Analysis of statistical data of the Ministry of Health of Ukraine, health departments of Odessa, Mykolaiv and Kherson regions for 2015-2017. There were used the methods of descriptive statistics and analysis of variance.

3. RESULTS

The number of registered patients with idiopathic PD in Ukraine in 2017 was 214,226 (Table 1), which corresponds to a prevalence of 67.5 per 100,000 population. It should be noted that this indicator is heterogeneous in the various regions of Ukraine. The largest number of patients was registered in Lviv (142.5 per 100000), Vinnytsia (135.9 per 100000), Cherkasy (108.6 per 100,000) and Kyiv (107.1 per 100,000) regions. The lowest prevalence rates are in the Luhansk (37.9 per 100,000), Kropivnitsky (42.5 per 100,000), Chernivtsi (49.0 per 100,000) and Ternopil (49,6 per 100,000) regions.

The prevalence rates of PD in the south of Ukraine also differ, thus in the Mykolayv region 65 cases per 100,000 population were registered, in Kherson region – 56 cases per 100,000, in Odesa region - 49,8 per 100,000.

The differences may be due to the various causes and, above all, variations in the methodology of patient examination, non-compliance with the diagnostic criteria, bad training of specialists, their poor motivation, lack of specialized offices and centers for the study and treatment of this pathology on the sites, low turnover of patients for health care in a weak economy andineffective reform of the health care system.

Table 1. Parkinson's disease prevalence per 100,000 population in Ukraine and its regions (2017)

Region	PD prevalence (2017)	
	per 100000	Absolute value
Ukraine	67,5	24226,0
More than 100 cases per 100 000		
Vinnitza region	135,9	1757,0
Cherkasy region	108,6	1113,0
City of Kyiv	108,4	2558,0
Kyiv region	107,1	1499,0
51-100 case per 100 000		
Khmeknitsk region	86,0	480,0
Volyn region	85,1	680,0
Chernigov region	84,8	730,0
Transcarpatean region	74,2	715,0
Poltava region	73,7	873,0
Zhytomyr region	71,3	713,0
Ivano-Frankovsk region	68,6	753,0
Mykolayv region	65,0	612,0
Khrakiv region	64,4	1455,0
Zaporizhia region	61,9	894,0
Dnipro region	59,3	1572,0
Kherson region	56,0	480,0
Sumy region	51,2	476,0
Rivne region	50,1	443,0
30-50 cases per 100000		
Donetsk region	49,9	818,0
Odesa region	49,8	954,0
Ternopil region	49,6	425,0
Chernivtsi region	49,0	353,0
Kropivnitsky	42,5	335,0
Lugansk region	37,9	226,0

This can be confirmed by epidemiological indicators in selected regions of Odessa, Mykolaiv and Kherson regions, confirming the thesis that hypodiagnosis does not happen due to environmental or geographical factors, but depends on the availability of trained specialists, their professional interests and a sufficient level of organizational and methodological work.

Thus, in Odesa region in 2017 the largest number of patients with PD was registered in Belgorod-Dnestrovsky district - 160.4 per 100000, in Tatarbunar district - 112.9 per 100000, in Belyaevsky district - 111.8 per 100000, at the same time the smallest number was in the Zaharyevsky district 20.2 per 100 000, in the Kodyma district - 16.8 per 100000, in the Razdelnyansky district - 11.1 per 100000, in the Veliko-Mikhailovsky district - 4.3 per 100000 (Table 2).

In the Mykolayv region the highest prevalence was registered in Kazanovsky (279 per 100000), Snigurovsky (162 per 100000), Bratsky (160 per 100000), and the smallest one- in Bashtansky (36 per 100000), Yelanetsky (16 per 100000) and Veselinovsky (11 per 100000) districts.

In the Kherson region (2017), the highest prevalence was is in the city of Nova Kakhovka (149 per 100000), Oleshkovsky (104 per 100000), Belozersky (88 per 100000) and Golopristansky (83 per 100000) districts, and the lowest one – in Bereslavsky (16 per 100,000) and in Hovo-Vorontsovsky – (6 per 100000) districts (see Table 4).

Unfortunately, there are no reliable statistical data on the age-weightedprevalence of PD in Ukraine. Nevertheless, it seems that the epidemiological patterns in the Southern Ukraine are close to the European ones.

4. DISCUSSION

We found that collecting data and surveillance of PD is not sufficient. Existing databases

do not take in the consideration the epidemiology of the clinical variants of PD. Some rural areas demonstrated underestimation and underdiagnosis of the idiopathic form of PD (especially in the early stages).

We suggest that PD affects 1% of people older than 60. Only small proportion of people with PD is diagnosed before the age of 50 [1]. However in Ukraine the average life expectancy is 71.78 years only.

For a long time on territories of the CIS countries, including Ukraine noted an incorrect diagnosis with unjustified overestimation of the role of vascular factor (diagnosis of "discirculatory encephalopathy with the phenomena of vascular parkinsonism"), which led to incorrect drug treatment of this group of patients, their disability, distortion of statistical indicators of prevalence [10,11]. Our research supports the importance of the collaboration between the neurologists and epidemiologists in the development of the effective methods of PD monitoring and control.

Table 2. Prevalence of Parkinson's disease per 100,000 population in odesa region (2017)

Settlements and districts	PD prevalence (2017)	
	per 100 000	Absolute value
Odesa	47,3	395
Bilgorod-Dnistrovsky	160,4	72
Podolsk	97,1	32
Teplodar	95,8	8
Izmail	92,4	54
Chornomorsk	32,1	19
Yuzhniy	31,4	8
Balta	23,4	6
All towns of Odesa region	55,7	575
More than 100 cases per 100 000		
Tatarbunarsky	112,9	34
Belyaevsky	111,8	79
Ananievsky	109,2	23
51-100 cases per 100 000		
Savransky	78,3	12
Ivanovsky	68,7	14
Oknyansky	65,9	10
Bolgradsky	65,0	36
Izmailsky	55,3	22
31-50 cases per 100000		
Limansky	43,9	25
Kiliysky	38,3	16
1-30 cases per 100000		
Shiryayevsky	29,2	6
Podolsky	28,1	6
Saratsky	26,4	9
Tarutinsky	25,9	8
Ovidiopilsky	25,0	16
Nikolaevsky	24,7	3
Berezovsky	23,1	6
Artsyzsky	22,3	8
Zakharyensky	20,2	3
Kodymsky	16,8	4
Reniysky	16,7	5
Razdelniansky	11,1	5
Veliko-Mikhailivsky	4,3	1
Lyubashovsky	4,2	1
Totally by the rural area	43,6	360
Totally by the Odesa region	49,8	954

Table 3. Prevalence of Parkinson's diseaseper 100,000 population in mykolayv region (2017)

Settlements and districts	PD prevalence (2017)	
	per 100 000	Absolute values
Mykolayv	61	242
Yuzhnoukrainsk	73	25
Voznesensk	37	10
Pervomaysk	36	20
All towns	58	297
More than 100 cases per 100 000		
Kazansky	279	45
Snigurovsky	162	53
Bratsky	160	23
Berezansky	119	23
Ochakovsky	86	21
Novobuzsky	82	21
Vradievsky	79	11
Berezniguvatsky	71	12
Krivoozersky	65	13
Mykokayvsky	63	15
Voznesensky	57	14
51-100 per 100 000		
Novoodessky	48	13
Domanovsky	43	9
Arbuzinsky	43	7
Zhovtneviy	41	17
Bashtanovskiy	36	11
1-30 per 100 000		
Veselinovsky	11	2
Elanetsky	16	2
Pervomaysky	12	3
Totall by the rural area	75	345
Totally by Mycolayv region	65	612

Table 4. Prevalence of Parkinson's diseaseper 100,000 population in Kherson region (2017)

Settlements and districts	PD prevalence (2017)	
	per 100 00	Absolute values
More than 100 per 100 000		
Nova Kakhovka	149	85
Oleshkovsky	104	60
51-100 per 100 000		
Novo-Troitsky	96	28
Belozaersky	88	47
Golopristansky	83	40
Chaplinsky	73	20
Novo-Serogozsky	69	9
Veliko-Lepetinsky	67	9
Dniprovsky	61	44
Veliko-Alexandrovsky	59	12
Ivanovasky	53	6

Settlements and districts	PD prevalence (2017)	
	per 100 00	Absolute values
31-50 per 100 000		
Genichesky	50	24
Kakhovsky	42	25
Gornostevsky	39	6
Visokopolsky	34	4
Veliko-Rpgachinsky	31	3
Skadovsky	31	12
Kalanchatsky		
1-30 per 100 000 of the population		
Kherson	31	83
Korabelniy	21	21
Suvorovsky	18	18
Borislavsky	16	6
Novo-Vorontsovsky	06	1
Totally by the rural area	59	312
Totally by Kherson region	56	480

5. CONCLUSION

Based on the total population and demographic properties in Odesa, Mykolaiv and Kherson regions, it can be concluded that at least 40-50% of patients with PD are left outside the sphere of medical care, and in some areas of these regions this index is 80-90%.

The revealed variability of indicators of PD burden in the Southern region of Ukraine points out not so much to the territorial differences of these indicators, but rather the fact of non-compliance with standards of epidemiological surveillance, untimely submission of information to statistical centers, bad training of specialists, as well as wrong summarization of the results of the studies by the total population.

Epidemiological studies in Odessa, Mykolaiv and Kherson regions have shown a large dispersion of data butcomparatively low prevalence of PD versus other regions of Ukraine. It could be a consequence of insufficient detection of PD by the specialists.

In order to optimize the diagnostic process and standardize epidemiological data, it is necessary to intensify the work of centers of extrapyramidal diseases in all regions of Ukraine, including intra-center and inter-center information databases to obtain adequate and pertinent statistical data.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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