PRACE ORYGINALNE

Teresa Pop[1,2], Andrzej Kwolek[1,2], Grzegorz Przysada[1,2], Ulrich Dockweiler[5], Anna-Maria Ax[5], Grzegorz Magoń[1,3], Agnieszka Bejer[1,3], Joanna Grzegorczyk[1,4], Ewa Lenart-Domka[1,3]

Social and Demographic Factors in Post-Stroke Patients with Co-morbid Depression

[1]Institute of Physiotherapy of University of Rzeszów
[2] Clinic Rehabilitation Ward, Voivodship Hospital No 2 in Rzeszów
[3]District Hospital in Łańcut
[4]Voivodship Specialist Hospital in Rzeszów
[5]Klinikum für Rehabilitation im Bad Salzuflen

Each year in Poland 60,000 patients, i.e. 0.16% of Polish population, suffer from stroke. Slightly higher incidence of new stroke is noted in Germany, where annually stroke onset is observed in roughly 165,000 patients, i.e. 0.20% of German population. The most common post-stroke complication is depression. It affects about 50% of post-stroke patients.

The goal of this study is to analyse the existing differences in socio-demographic factors in German and Polish populations.

The study group consisted of post-stroke patients with co-morbid depression who were receiving treatment in a clinic rehabilitation ward, in a rehabilitation ward of a specialist hospital, and district hospital as well as in rehabilitation clinics in Germany, in 2007–2008.

The tests involved the total of 137 patients, with the mean age of 68.5.

The analysis included some socio-demographic factors such as: age, financial situation, living arrangements, educational attainment and marital status.

The research shows that the incidence of depression in post-stroke patients was determined by age, lower financial status as well as living alone in the patients of both the Polish and German populations.

Conclusions. With regard to patients who suffered stroke, depression is a frequent complication in the Polish population. The financial situation and living arrangements impact the frequency of depression incidence in stroke survivors in a statistically significant way. There is a statistically significant difference in the incidence of depression between patients living alone and those living with families.

Key words: *stroke, depression, socio-demographic factors*

Czynniki społeczno-demograficzne u chorych po udarze mózgu ze współistniejącą depresją

W Polsce rocznie zapada na udar mózgu (UM) około 60 000 chorych, co stanowi 0,16% populacji polskiej. Nieco więcej nowych zachorowań obserwuje się w Niemczech gdzie rocznie zapada na udar mózgu około 165 000 chorych, co stanowi 0,20% populacji niemieckiej. Najczęstszym powikłaniem udaru mózgu jest depresja. Dotyka ona około 50% pacjentów po udarze mózgu.

Celem pracy jest analiza istniejących różnic dotyczących czynników społeczno-demograficznych w populacji niemieckiej i polskiej.

Grupę badaną stanowili pacjenci po przebytym udarze mózgu ze współistniejącą depresją leczeni w klinicznym oddziale rehabilitacji, oddziale rehabilitacji szpitala specjalistycznego, szpitala powiatowego oraz w klinikach rehabilitacyjnych w Niemczech, w latach 2007–2008.

Łącznie przebadano137 pacjentów. Średnia wieku badanej grupy wynosiła 68,5 lat.

W analizie wykorzystano niektóre czynniki społeczno-demograficzne: wiek, sytuacja finansowa, warunki mieszkaniowe, wykształcenie i stan cywilny.

Z badań własnych wynika, iż częstość występowania depresji u chorych po udarze mózgu determinowana była przez wiek, gorszą sytuacją finansową oraz samotne życie i to zarówno wśród pacjentów populacji polskiej i niemieckiej.

Wnioski. U chorych po przebytym udarze mózgu depresja jest częstszym powikłaniem w populacji polskiej. Sytuacja finansowa oraz warunki mieszkaniowe w sposób istotny statystycznie wpływają na częstość występowania depresji u chorych po przebytym udarze mózgu. Istnieje statystycznie istotna różnica dotycząca występowania depresji pomiędzy pacjentami żyjącymi samotnie a pacjentami żyjącymi w rodzinie.

Słowa kluczowe: *udar mózgu, depresja, czynniki społeczno-demograficzne*

Each year in Poland 60,000 patients, i.e. 0.16% of Polish population, suffer from stroke. [1, 2]. Slightly higher incidence of new stroke is noted in Germany, where annually stroke onset is observed in roughly 165,000 patients, i.e. 0.20% of German population. According to reports of the German Erlangen association which registers post-stroke patients in Germany, stroke is the third most frequent cause of death, and generates the highest treatment costs of all commonly occurring disorders, which results mainly from the necessity to provide such patients with nursing and long-term rehabilitation. The high costs of treatment and nursing are among the underlying reasons for introducing a wide range of activities both with regard to primary and secondary preventive measures as well as management of the acute phase of stroke [3]. The necessity of ongoing enhancement of preventive measures, improvement in intense diagnostic, treatment and rehabilitation procedures in the acute phase of stroke, accompanied by retained continuity of rehabilitation are confirmed by recommendations of the National Stroke Prevention and Treatment Programme. This is due to the fact that stroke causes negative social, economic and cultural results. [1, 4, 5].

The most common complication of stroke is depression which affects roughly 50% stroke survivors [6, 7, 8, 9]. According to available sources the peak incidence of the condition is noted from 3 to 6 months after stroke onset and occurs in 47 to 53% of patients. [6, 7,9]. Patients with post-stroke depression [PSD) take longer, and find it harder to recover as they more frequently abandon rehabilitation treatment, and show less willingness or motivation for regaining skills. Symptoms associated with onset of depression are divided into primary: depressed mood, loss of interest and satisfaction, reduced level of energy and activity, and additional symptoms: diminished concentration and attention, decreased self-confidence, feel-ing of guilt and low self-esteem, propensity for crying and irritability, sleep impairment, changes in appetite (commonly - loss of appetite), social withdrawal, suicidal thoughts. The onset of depression may be stimulated by coexisting biological, psychological and social factors including the loss of independence, increased dependence on one's environment, social isolation, changes in life status, lack of care from other people, poor economical conditions and demographic factors such as age, educational attainment [1,2,3,10]. Depression should be treated regardless of its cause, as it greatly hinders patients' adaptation to new living conditions resulting from stroke.

The goal of this study is to analyse the existing differences in socio-demographic factors in German and Polish populations.

Criteria used for including in the study:
– up to 3 months from stroke onset
– stroke confirmed with computed tomography, magnetic resonance imaging
– written consent for including in the study.
Criteria used for excluding from the study:
– sensory and motor aphasia precluding logical verbal contact
– presence of autopsychic and allopsychic disorientation
– cognitive impairments (MMSE < 22 points),
– lack of written consent for including in the study

MATERIAL AND METHOD

The study group consisted of post-stroke patients with co-morbid depression who were receiving treatment in a clinic rehabilitation ward, in a rehabilitation ward of a specialist hospital, and district hospital as well as in rehabilitation clinics in Germany, in North Rhine-Westphalia, in 2007–2008

TABLE 1. Age of patients in the study group

Age	$\bar{x}$	Me	Min	Max	Q_{25}	Q_{75}	s
	68,5	70,0	21	92	61,0	77,0	12,7

$\bar{x}$ – arithmetic mean – the average value of the variable;

Me – median value (half of the results reach lesser values and half reaches greater values),

Min – minimum

Max – maximum

Q_{25} – lower quartile (allows to determine the level below which falls the value for a given variable for every fourth person

Q_{75} – upper quartile (allows to determine the level above which falls the value for a given variable for every fourth person

s – standard deviation – is a measurement of „average" deviation from median value.

TABLE 2. Age in both study populations

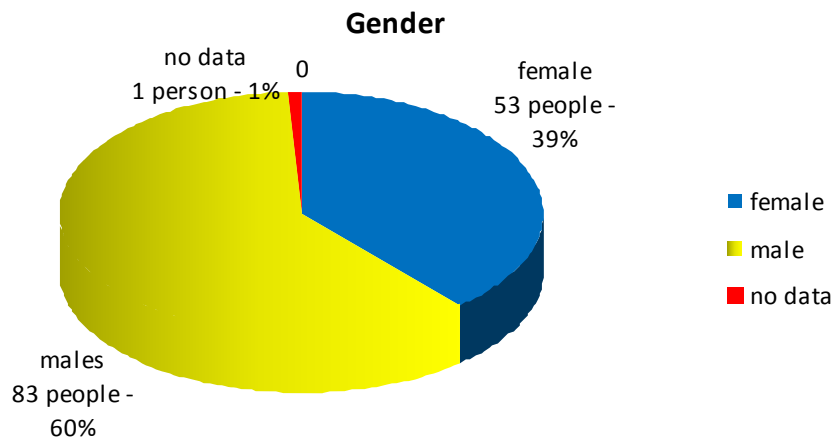| population	$\bar{x}$	s	Min	Max	Q_{25}	Me	Q_{75}
Polish	67,0	13,4	21	89	60	70	77
German	69,9	12,0	43	92	64	70,5	80
p	0,1822						

FIGURE 1. Gender structure

TABLE 3. Gender

Gender	Polish population – number of people (percent)	German population – number of people (percent)
female	32 (46,0%)	21 (31,0%)
male	37 (54,0%)	46 (69,0%)
p	0,0723	

Tests involved the total of 137 patients, with the mean age of 68.5, and age span from 21 to 92 (table 1).

Table 2 presents descriptive statistics related to the stroke survivors' age. The average in the Polish population and the German population is similar and slightly below 70 years of age.

The study group included 60.0% males and 39.0% females (Fig.1).

In the study group, the Polish population showed equal gender distribution, while the German population included more men (table 3).

Method:

The research has a character of a joint study programme conducted in those centres for several years. The tests involved screening for the level of dementia by means of MMES scale, and for the level of depression with Beck Inventory, assessment of motor skills with Motor Function Assessment Scale (MFAS), measure of performance in basic activities of daily living - Barthel Index. For the needs of the analysis only selected socio-demographic factors were taken into account: age, financial situation, living arrangements, educational attainment and marital status. The patients were examined twice. The first test was conducted on the day of admission to the ward/ clinic, the second test was performed after 3-week stay in the ward/clinic.

TABLE 4. Incidence of depression

Timing of the measurement	Depression incidence	
	No number of people (percent)	Yes number of people (percent)
First test	77 (56,2%)	60 (43,8%)
Second test	93 (67,9%)	44 (32,1%)

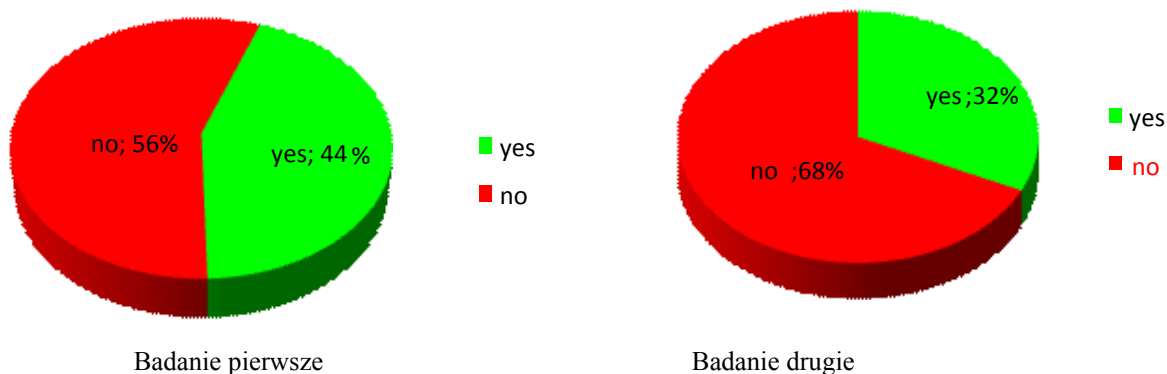Badanie pierwsze   Badanie drugie

FIGURE 2. Częstość występowania depresji

TABLE 5. Incidence of depression in Polish and German populations

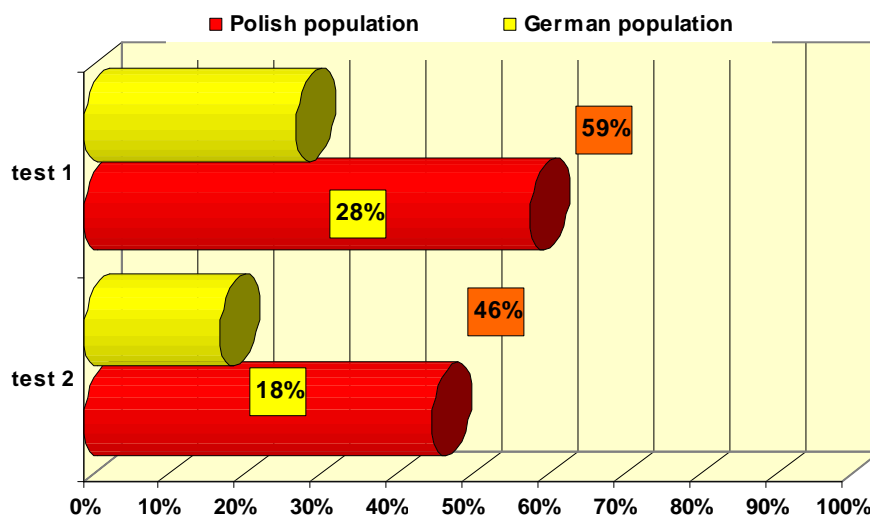| Test	Incidence of depression				p
	Polish population		German population		
	N	%	N	%	
first	41/69	59%	19/68	28%	0,0002***
second	32/69	46%	12/68	18%	0,0003***

FIGURE 3. Incidence of depression in Polish and German populations

TABLE 6. Depression vs. age of post-stroke patients

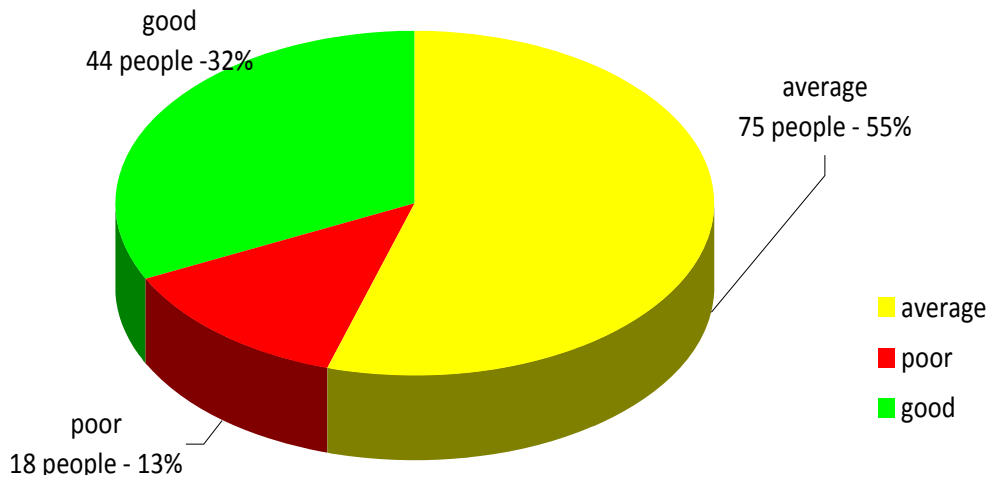| Depression (first test)	Years of age		
	$\bar{x}$	s	Me
no	68,1	14,2	70,0
yes	69,0	10,7	70,5
p	0,8951		

Self-assessed financial situation

FIGURE 4. Financial situation

Table 7. Financial situation

Depression (first test)	Financial situation ($p = 0,0017**$)			Total
	average – number of people (percent)	poor – number of people (percent)	good – number of people (percent)	
no	39 (50,6%)	5 (6,5%)	33 (42,9%)	77
yes	36 (60,0%)	13 (21,7%)	11 (18,3%)	60
Total	75	18	44	137

Table 8. Statistical analysis of financial situation

Financial situation	Polish population number of people (percent)	German population number of people (percent)
poor	14 (20%)	4 (6%)
average	41 (59%)	34 (50%)
good	14 (20%)	30 (44%)
p	0,0024**	

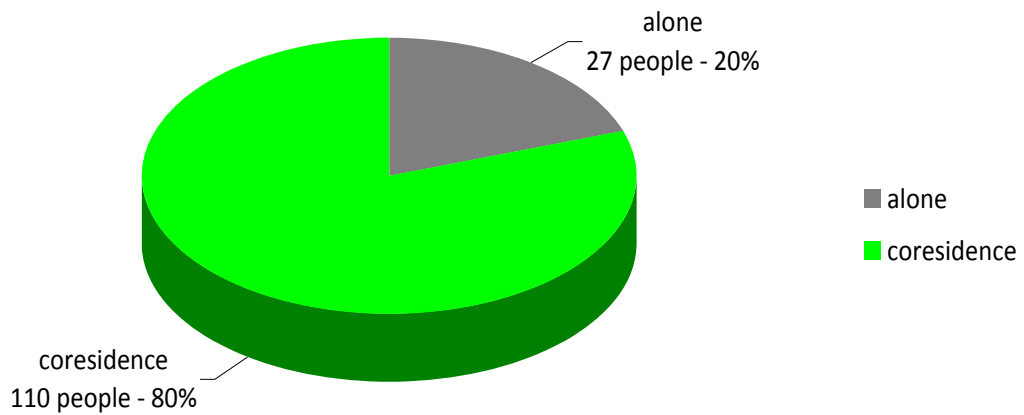## Family status (living arrangements)

FIGURE 5. Living arrangement (with family, alone)

TABLE 9. Impact of living arrangements on depression

Depression (first test)	Living arrangements (*p* = 0,6109)		Total
	living alone number of people (%)	coresidence number of people (%)	
no	14 (18,2%)	63 (81,8%)	77
yes	13 (21,7%)	47 (78,3%)	60
Total	27	110	137

TABLE 10. Type of residence vs. depression, Polish population and German population

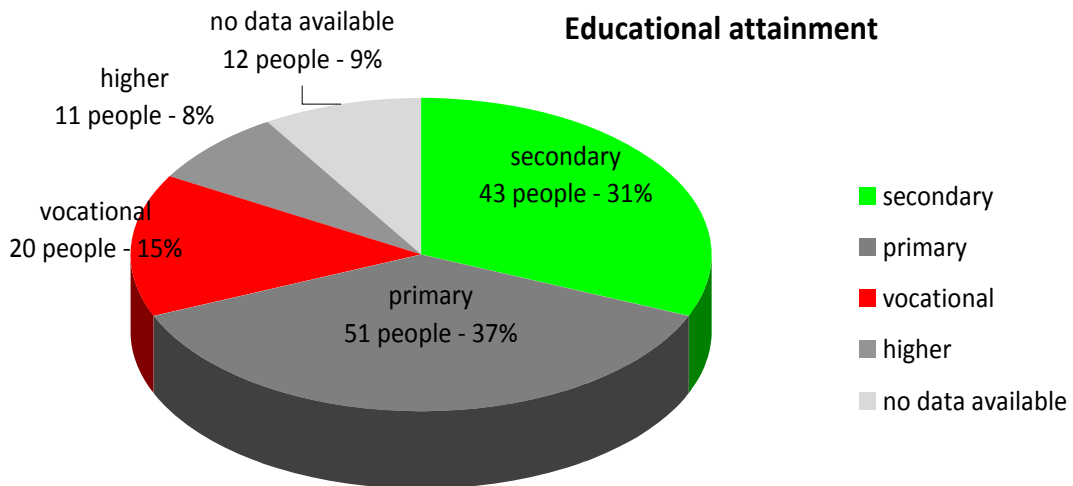| Living arrangements	Polish population number of people (percent)	German population number of people (percent)
living alone	9 (13,0%)	18 (26,0%)
coresidence	60 (87,0%)	50 (74,0%)
p	0,0482*	

FIGURE 6. Educational attainment within the study group

TABLE 11. Educational attainment within the study group

Education	Polish population number of people (percent)	German population number of people (percent)
none	3 (4,0%)	9 (13,0%)
primary	20 (29,0%)	31 (46,0%)
vocational	18 (26,0%)	2 (3,0%)
secondary	20 (29,0%)	23 (34,0%)
higher	8 (12,0%)	3 (4,0%)
p	0,0004***	

Marital status

divorced — 17 people — 12%
priest — 1 person — 1%
single — 13 people — 9%
married — 75 people — 55%
widowed — 31 people — 23%
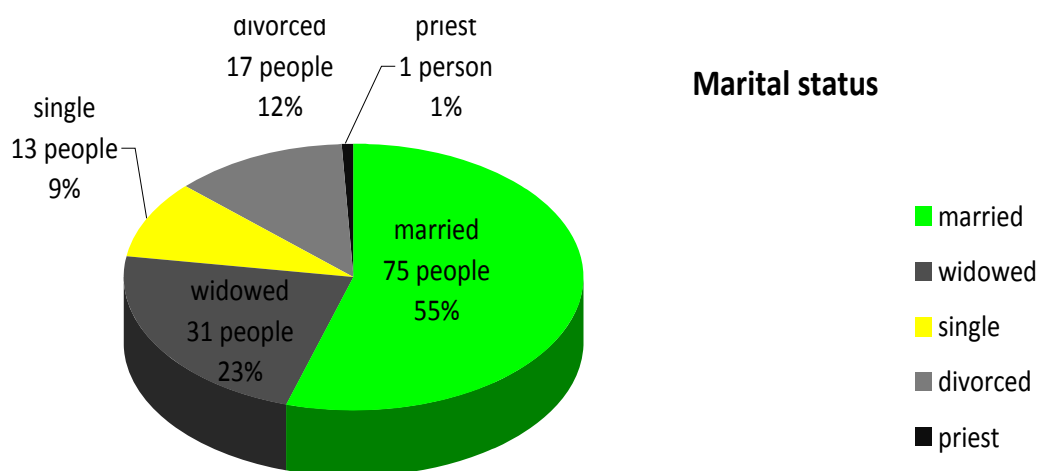
- married
- widowed
- single
- divorced
- priest

FIGURE 7. Marital status in the study group

TABLE 12. Marital status of the study group

Marital status	Polish population number of people (percent)	German population number of people (percent)
married	28 (41%)	47 (69%)
widowed	19 (28%)	12 (18%)
single	7 (10%)	6 (9%)
divorced	14 (20%)	3 (4%)
priest	1 (1%)	0 (0%)
p	0,0056**	

The obtained data was processed statistically by means of: descriptive statistics, Mann-Whitney Test, Chi-square test for independence Spearman's rank correlation coefficient.

RESULTS

During the first test, depression was found in 43% of patients, whereas the second test, after a complex hospital rehabilitation treatment was finished, identified depression in 32,1% of the patients (Table 4, Fig. 2).

Depression more often occurred in the patients of the Polish population, compared to the German population. The first test found depression in 59% of the Polish patients, and the second test – in 46% of the group. The first test found depression in 28% of the German patients, and the second test – in 18% of the group. The obtained results were statistically significant (Table 5, Fig. 3).

The comparison of the patients' mean age, based on descriptive statistics and Mann-Whitney Test shows there is no correlation between the incidence of depression and the age of stroke survivors (Table 6).

Stroke more often occurred in older individuals, with lower financial status and living alone (both in the German and Polish populations).

Among individuals with depression, 81.7% of the study group had average or poor financial situation. Among individuals without depression, 51.1% of the study group described their financial situation as average or poor.

However, the self-assessment of the financial situation is visibly lower within the Polish population and the result is statistically significant (Table 8).

110 individuals lived with their families, which is 80.0% of the study group. 27 individuals lived alone, which is 20.0% of the group (Fig. 5).

The analysis shows that 21.7% stroke survivors with co-morbid depression lived alone, whereas in the group of patients without depression, those living alone constituted 18.2% (table 9, Fig 5).

The analysis of data related to the study group (excluding the depression incidence factor) shows that majority of patients lived with family members. Within the Polish population only every eighth patient (13%) lived alone, while in the German population it was every fourth patient (26%), and this difference is statistically significant (Table 10).

Compared with the German population, the Polish population included more patients with higher and vocational level of education. More German patients had secondary and primary level of educational attainment (Fig. 6). Statistical tests explicitly show substantial significance of the differences found in the level of educational attainment (Table 11).

The analysis of the marital status within the study group showed that in the Polish population majority of stroke survivors were single, divorced or widowed, whereas in the German population majority of the group lived in permanent relationships (married) (Fig. 7). The differences were statistically significant (Table 12).

DISCUSSION

The goal of the study was to analyse how often depression occurs in post-stroke patients, and to assess whether socio-demographic factors, such as age, gender, financial status, living arrangements (with family or alone), educational attainment, marital status, which characterise the patient's condition at the moment of his/her admission to a rehabilitation ward, impact the final outcome of the rehabilitation and the incidence of depression. Similar research involving stroke survivors was conducted by other researchers [11, 12,13,14,15,16,17]. The study also addressed the differences between the Polish and German populations regarding the aforementioned factors.

The study involved populations greatly differing in terms of cultural, social and economic backgrounds. The study group consisted of post-stroke patients receiving treatment in rehabilitation wards in Poland and Germany. The incidence of depression was evaluated on the basis of scores obtained in the course of assessment by means of Beck Depression Inventory. The tests were performed twice, upon admission into a ward/clinic and after the conclusion of complex neurorehabilitation process. Similarly, Ziółkowska-Kochan and Pracka examined the intensification of clinical symptoms in PSD using, among others, Beck Depression Inventory [18]. Prevalence of depression in stroke survivors is significant, by some authors estimated at the level of 17-65%, by other researchers at 20-30% and is distinctively higher than in general population [4]. Such variety of results obtained in different studies is conditioned by the presence of numerous factors, which impact the final evaluation. Those include age, gender, financial situation, living arrangements, educational attainment, marital status [18,19,14].

Incidence of depression was higher in the Polish group and totalled 59% during the first test and 46% during the second test. In the German group 28% of the patients presented with depression during the first test, and 18% during the second test. The differences were statistically significant. The analysis of the conducted descriptive statistics related to stroke survivors' age showed the mean age of Poles and Germans in the study group was similar, and slightly below 70 years of age. In the Polish group every fourth individual was affected by stroke before or at 60 years of age, whereas in the German group before or at 64. In at least half of the Polish patients stroke occurred at or after 70 years of age, and in every fourth person at or after 77 years of age. In the German population those border values were respectively at 71 and 80 years of age. Therefore, it can be assumed that stroke, and the resulting risk of PSD concerns older people, which is reflected by data described in other sources [100,10.9,15]. However, the significance of obtained results was not noted.

The analysis of the gender structure shows that in the Polish group the distribution was close to even, while in the German group men clearly prevailed, however the differences did not bear significance. The fact that should be considered with regard to the data relates to the differences in the structure of both societies resulting from e.g. general health condition, existing pro-health activities, life expectancy, or life expectancy separately for women and men. According to Val Morrisona et al., depression occurs more frequently in women than in men, additionally the incidence of co-morbid depression results from a high level of anxiety and considerable disability [20].

Findings of our research show that distinctively lower financial situation was a characteristic of the Polish population. However it is difficult to conclude on the grounds of the obtained data whether individuals who suffered stroke were people with modest means, as this would require including a control group into the study. Majority of patients lived with their families. In the group of patients living alone German patients clearly prevailed. However, the results cannot be generalised. The differences may result from the traditional multi-generation model of the Polish family and the currently promoted consumption-oriented lifestyle. With regard to educational attainment more Polish patients had higher and vocational education while German patients more often had

secondary and primary education, and the obtained results were statistically significant.

The analysis showed that majority of stroke survivors within the Polish population were either single (never married), divorced or widowed. Within the German population majority was in permanent relationships (married). The obtained results were statistically significant.

Spetruk et al., showed that predictors of depression include: living alone, poor living conditions, number of co-morbidities (risk factors for stroke) which reduce physical condition of stroke survivors, whereas place of residence, age, paretic side do not impact the incidence and the course of PSD [21].

Findings of our research show that the incidence of depression in post-stroke patients is determined by age, lower financial status and living alone, in patients of both German and Polish populations. Depression greatly influences the process of health recovery and predictions related to post-stroke patients, therefore it is important to identify factors increasing the risk of its onset, including the socio-demographic factors. Early identification and treatment of depression are essential as depression reduces motivation for cooperation with regard to rehabilitation, prolongs the time needed for hospitalization, causes deterioration of patients' and their families' quality of life, and increases costs of treatment and rehabilitation of stroke survivors [22].

CONCLUSIONS

With regard to stroke survivors, depression is a frequent complication in the Polish population

1. The financial status and living arrangements impact the frequency of depression incidence in post-stroke patients in a statistically significant way

2. The German and Polish populations of post-stroke survivors differ in terms of educational attainment and marital status.

3. There is a statistically significant difference in the incidence of depression between patients living alone and those living with families.

REFERENCES

1. *Raport Zespołu Ekspertów Narodowego Programu Profilaktyki i Leczenia Udaru Mózgu. [Report by Expert Team of the National Stroke Prevention and Treatment Programme] Postępowanie w ostrym udarze niedokrwiennym mózgu. [Management of acute ischemic stroke]* Neur. Neurochir. Pol. Supl.4/1999.

2. Kwolek A.: *Rehabilitacja medyczna* tom 2 [*Medical Rehabilitation, vol.2*], Urban&Partner Wrocław 2003, 10–14.

3. www:public-health.de. Schlaganfall in Deutschland

4. Domka E., Myjkowska E., Kwolek A.: *Ocena częstości występowania powikłań u pacjentów rehabilitowanych z powodu udaru mózgu [Assessment of complications incidence in patients receiving rehabilitation treatment due to stroke]*, Neurol. Neuroch. Pol. 2005, 39, 4, 300–309.

5. Członkowska A., Sarzyńska-Długosz I., Kwolek A., Krawczyk M.: *Ocena potrzeb w dziedzinie rehabilitacji poudarowej w Polsce. [Needs assessment regarding post-stroke rehabilitation in Poland]*, Neurol.Neuroch.Pol 2006, 40, 6, 471–477.

6. Wallesch C.W.: *Depression nach Schlaganfall- Wege zur Diagnose*, Fortschr Neurol. Psychiat. 2006; 74: 249–250.

7. Huff W., Steckel R., Sitzer M.: *Poststroke Depression. Epidemiologie, Risikfaktoren und Auswirkungen auf den Verlauf des Schlaganfalls*, Nervenarzt 2003, 74, 104–114.

8. Morris P.L. Robinson R.G., Andrzejewski P i wsp.: *Association of depression with 10-year post-stroke mortality*, Am.J.Psychiatry 1993, 150, 124–129.

9. Wichowicz H.: *Depresja poudarowa – zaburzenie biologiczne czy psychopochodne? [Post-stroke depression – a disorder of biological or mental origin?]*, Udar Mózgu 2008, 10, 1, 40–48.

10. Diener H.Ch, Forsting M.: *Udar mózgu- podręczny atlas, [Stroke – a concise atlas; polish translation]*, Urban& Partner Wrocław 2004 .

11. Huff W., Ruhrmann S.,Sitzer M.: *Diagnostik und Therapie der Depression naach Schlaganfall*, Fortschr Neurol. Psychiat. 2001; 69, 581–591.

12. Jessica L. Johnson,Pamela A. Minarik,Karin V. Nyström, Cynthia Bautista, Mark J. Gorman: *Poststroke Depression Incidence and Risk Factors: An Integrative Literature Review,* Journal of Neuroscience Nursing. 2006, 38, 4, 316–326.

13. A.T.F. Beekman B.W.J. H. Penninx D.J.H. Deeg J. Ormel J.H. Smit A.W. Braam W.van Tilburg: *Depression in survivors of stroke: a community-based study of prevalence, risk factors and consequences*, Soc Psychiatry Psychiatr Epidemiol 1998, 33, 463–470.

14. Malevani J.: *Depression nach Schlaganfall Zeitschrift für Gerontopsychologie&-psychiatrie*, 2005,18(1),17–22.

15. Hüwel J., Weisner B., Kemmer H., Heyder J.: *Depressive Verstimmung im Akutstadium nach erstmalimem ischämischen Hirninfarkt*, Nervenarzt 1998, 69, 330–334.

16. Kronenberg G.,Katchanov J., Endres M.: *Poststroke-Depression*, Nerwenarzt 2006, 77, 1176–1185.

17. Nolte C., H. Müller-Nordhorn J., Jungehülsing J.,G., Rossnagel K., Reich A., Roll S., Laumeier I., Beerfelde D., Willich S.,N., Villringer A.: *Zwei einfache Fragen zur Diagnose der Post-Schlaganfall Depression*, Fortschr Neurol. Psychiat 2006, 74, 251–256.

18. Ziółkowska-Kochan M., Pracka D.: *Depresja po udarze. Psychiatria w praktyce Ogólnolekarskiej [Post-stroke Depression. Psychiatry in general medical practice]* 2003,3,(4),203–208.

19. Dohmen C., Garlip G., Sitzer M., Malevani J., Kessler K.,R., Huff W.: *Post-Stroke-Depression. Algorithmus für ein standardisiertes diagnostisches Vorgehen in der klinischen Ruotine*. Fortschr Neurol. Psychiat. 2006, 74, 257–262.

20. Morrison V., Pollard B., Johnston M., MacWalter R.: *Anxiety and depression 3 years following stroke: Demographic, clinical, and psychological predictors*. Journal of Psychosomatic Research 59. 2005, 209–213.
21. Spetruk P., Opala G., Rycerski.: *Wpływ leczenia usprawniającego na przebieg depresji poudarowej. [Impact of recovery treatment on the course of post-stroke depression],* Rehabilitacja Medyczna 2006, 10 special issue, 90.
22. Berny Wł., Zub W., Jarmundowicz Wł., Weiser A., Rosińczuk-Tonderys J., Trybała E.: *Funkcjonowanie społeczne i zawodowe chorych po udarze mózgu. [Social and professional performance of post-stroke patients]*, Annales Universitatis Mariae Curie-Skłodowska Lublin, 2005, Vol. LX, 26, 24, D

Pop Teresa
35-605 Rzeszów
ul. Zimowit 3/1
e-mail: popter@interia.pl