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Is depression during affective disorders connected with elevated homocysteine and MCV levels?

Depression is regarded as a polyetiological disorder whose development may be related to dietary habits, including so-called extrinsic factors such as folic acid or vitamin B12 deficiencies in a diet. The interrelations exist between: folic acid and vitamin B12, their serum levels, their effect on the nervous system and the mental state of the patient (3, 6, 10, 12, 13, 15). In recent years, there has been an increase in research into the connection between homocysteine, folic acid, vitamin B12 and such mental disorders as depression, dementia, Alzheimer's disease, and schizophrenia. Elevated homocysteine level is regarded as a risk factor for the development of atheroma; also, the connection between homocysteine and affective disorders, particularly depression, seems intriguing (5, 7, 8, 11, 12, 14). The content of such vitamins as folic acid and vitamin B12 is reflected in the blood count, and in some of the hematologic parameters, e.g. MCV, they are related to megaloblastic anaemia (4, 6). Various tests suggest the importance of folic acid and vitamin B12 as developmental factors in depressive episodes, recurrent depressive disorders, and depressive phases in bipolar affective disorder (7, 9, 10, 12, 14, 15). Much research has been conducted on unipolar depression, while there are still few scientific reports on vitamin deficiencies in particular phases of bipolar affective disorder (14). Folic acid and vitamin B12 deficiencies in the serum, whose accurate diagnostic indicator is homocysteine (especially for folic acid), are linked with depression as well as with poor response to antidepressive treatment (2, 9). Scientific research reveals connections between low serum folic acid and vitamin B12 content and elevated serum homocysteine content as a possible risk factor in the development of depression; the deficiencies in question are also observed in patients who have been suffering from depressive disorders for some time. Many researchers suggest the significance of folic acid and vitamin B12 as reinforcement of antidepressive treatment, especially in elderly people and in patients whose response to antidepressive medication is unsatisfactory (2). Folic acid and vitamin B12 participate in the metabolism of S-adenosyl-L-methionine (SAM), a donator of methyl groups which play a decisive role in the functioning of the nervous system (6). The effect of folic acid on membrane phospholipids in neurons is also symptomatic. It is thus important to pay attention to those laboratory parameters, especially homocysteine and MCV (mean corpuscular volume), that give the picture of metabolism and deficiencies of the mentioned vitamins. This may be significant in the prevention of relapse as well as of the first episodes of depression, in the effectiveness of the treatment of affective disorders through supplementing antidepressive treatment, with small doses of folic acid and vitamin B12 in some cases of depression (2, 9, 14).

The aims of this study were: 1) to compare homocysteine and MCV levels in depressed patients in the course of unipolar and bipolar affective disorders and the healthy control group members, 2) to look for connections between serum homocysteine and MCV levels and sociodemographic data (age, sex) in the group of patients and the control group.

PATIENTS

Participants included 46 people: 23 patients and 23 healthy people. Twenty-three patients (11 females, 12 males) were hospitalized with diagnosed depressive episode in the course of unipolar – F33 (13 patients), or bipolar – F31 affective disorders (10 patients) according to ICD-10, in the Neuropsychiatric Hospital in Lublin. The average age in the group was 50.64 years for women (SD=7.61), and 49.25 years for men (SD=10.85). The control group consisted of 23 healthy people chosen to match the patients with regard to sex and age. The average age in the control group was 45.67 for women (SD=7.53), and 46.12 for men (SD=10.19). Inclusion criteria: 1. the presence of depressive episode F 33 or F 31 as described in the ICD–10, 2. age: 30–66 years in both groups. Exclusion criteria: 1. symptoms of organic CNS impairment, 2. alcohol or other addictive substances dependence (smoking more than 5 cigarettes per day), 3. serious somatic diseases (also cardiovascular diseases) or features of inflammatory infection (based on physical examination and ESR>10 mm/h), 4. taking medicines that significantly influence the laboratory parameters in question (lithium, clozapine, hydroxyurea, chemotherapics such as trimethoprim).

METHODS

The following methods were applied:

1. A questionnaire, designed by the authors, that included basic sociodemographic data for both groups as well as information concerning the disease (received from the patients themselves and their medical records).

2. The Beck Depression Inventory (BDI) (1) was used to assess depression in patients on the admission to hospital – during the first week (at the same time when blood count was performed). Members of the control group were also assessed with the BDI.

3. Analysis of blood samples, taken from the patients at the admission to hospital, with their written permission, and from the healthy control group members. Serum, which was used in the analysis, was initially stored in the temperature of –25 degrees Celsius in the Laboratory of the Neuropsychiatric Hospital in Lublin, which has the International Quality Certificate STRECK / STATS' USA Omaha, and then analysed in the Department of Medical Diagnosis of the Medical University in Lublin, with the use of the IMX homocysteine tracer produced by ABBOTT. In the analysis of the data the following ranges of normal laboratory parameters for homocysteine were assumed: 4.45–12.42 umol/l, (4.45–12.42 umol/l – normal, 12.42 umol/l or more – elevated). And for laboratory parameter – MCV the following ranges were used (consistent with the norms of the laboratory): MCV (fl.): up to 76 fl. – low level ,77–92 fl. – normal level , 93 fl. or more – high, elevated level. The information from the medical records of the patients was also used in the study, i.e. blood count routinely performed at the admission to hospital (for the analysis of MCV parameter).

4. Statistical methods used in the analysis: Students' t-test for independent samples, Pearson's chi-square test, Kendall's tau-b correlation coefficient, the Mann-Whitney U test, the Kolmogorov-Smirnov normality distribution test.

RESULTS

SOCIODEMOGRAPHIC DATA

A g e . The average age in the group of patients was x=49.91 years (SD=9.25), and in the control group x=45.83 years (SD=8.31). The group of patients was comparable to the control group on the basis of age (p=0.122). E d u c a t i o n . The majority of the participants had secondary/vocational education, i.e. 65.2% (30 people), 10.9% had primary education (5 people), and 23.9% had higher education (11 people). M a r i t a l s t a t u s . 60.9% (28 people) were married, 13.0% (6 people) had never been married, 15.2% (7 people) were divorced, and 10.9% (5 people) were widowed. D w e l l i n g p l a c e . The number of urban dwellers, 56.5% – 26 people, was slightly higher than that of rural dwellers, 43.5% – 20 people.

INFORMATION CONCERNING THE DISORDER

1. G r o u p d i v i s i o n a c c o r d i n g t o d i a g n o s i s . 13 patients suffered from recurrent depressive disorders – F33, and 10 from the depressive phase of bipolar affective disorder – F31 according to the ICD-10.

2. B D I s c a l e . The intensity of depression which was measured with the BDI depressive patients scored a mean of x=33.087 points, i.e. the intensity of their depression was moderate. The lowest possible score was 13 points, the highest – 58 points. 28.6% of the patients had mild depression, 60.7% – moderate, and 10.7% – severe. With the mean of x=37.45 (SD=12.79), female patients scored slightly higher in the BDI than men – the mean of x=29.08 (SD=9.60) (however, the differences were hardly significant in the group of patients, based on the Student's t-test – p=0.089). In the control group the mean was x=1.087 points (SD=1.59), with the minimal score of 0, and the maximal of 6 points, i.e. no-one had a depressive disorder.

SERUM HOMOCYSTEINE LEVELS IN PATIENTS AND IN CONTROL GROUP MEMBERS

1. The mean laboratory value of the variable homocysteine in the examined serums fell within the normal value ranges and was x=11.64 (SD=4.36) for the patients. The lowest homocysteine level was 6.28, the highest 24.17 umol/l. The mean for the control group was x=8.39 (SD=2.23), i.e. normal. The lowest homocysteine in the control group was 5.23 umol/l, the highest 13.11 umol/l. Mean homocysteine values are markedly higher in patients with depressive disorders in comparison to healthy control group members – a result that is statistically significant, $p<0.003$ (Table 1). The mean homocysteine level for female patients was x=10.63 (SD=5.07) compared to x=7.22 (SD=1.40) in the control group. The mean homocysteine level for male patients was x=12.56 (SD=3.56) compared to x=10.57 (SD=1.85) in the control group.

2. The percentages of the ranges of laboratory findings for homocysteine in the group of patients, in reference to the normal ranges as shown above, were as follows: normal values were found in 56.5% of the patients, elevated homocysteine levels were observed in 43.5%. In the control group, normal values were found in 91.3% of its members, while elevated homocysteine levels were observed only in 8.7%. A statistically significant result was obtained in the chi-square independence test, chi-square = 7.22 ($p<0.007$): homocysteine level differentiates the patients from the control group members, i.e. elevated homocysteine levels are much more common in patients with depressive disorders than in healthy control group members (Table 1).

Table 1. Correlation between diagnosis, the group of patients and the control group, and homocysteine level

Group	Homocysteine level								
	N	Mean	SD	95% Confidence interval for mean		Min	Max	t	p
				Lower bound	Upper bound				
Patients	23	11.646	4.3609	9.7598	13.5315	6.28	24.17	3.185	0.003
Control	23	8.390	2.2385	7.4220	9.3580	5.23	13.11		
Total	46	10.018	3.8021	8.8887	11.1469	5.23	24.17		
Diagnosis								U	p
Depression-F33	13	10.568	4.8420	7.6417	13.4937	6.57	24.17	35.00	0.063
Depression-F31	10	13.047	3.3716	10.6351	15.4589	6.28	18.77		
Total	23	11.646	4.3609	9.7598	13.5315	6.28	24.17		

		Group			Total
			Patients	Control	
Homocysteine level	Normal	Count	13	21	34
		%	56.5%	91.3%	73.9%
	High	Count	10	2	12
		%	43.5%	8.7%	26.1%
	Total	Count	23	23	46
		%	100.0%	100.0%	100.0%
Chi-Square	7.22				
p	0.007				

Patients' group					
		Sex	Female	Male	Total
Homocysteine level	Normal	Count	9	4	13
		%	81.8%	33.3%	56.5%
	High	Count	2	8	10
		%	18.2%	66.7%	43.5%
	Total	Count	11	12	23
		%	100.0%	100.0%	100.0%
Chi-Square	5.49				
p	0.019				

Control group					
		Sex	Female	Male	Total
Homocysteine level	Normal	Count	15	6	21
		%	100.0%	75.0%	91.3%
	High	Count	0	2	2
		%	0 %	25.0%	8.7%
	Total	Count	15	8	23
		%	100.0%	100.0%	100.0%
Chi-Square	4.107				
p	0.043				

MCV LEVELS IN PATIENTS AND IN CONTROL GROUP

Table 2. Correlation between diagnosis, the group of patients and the control group, and MCV level

MCV level									
	N	Mean	SD	95% Confidence interval for mean		Min	Max	t	p
Group				Lower bound	Upper bound				
Patients	23	94.217	4.067	92.459	95.976	86	104	3.89	0.0003
Control	23	89.652	3.892	87.969	91.335	80	97		
Total	46	91.935	4.563	90.580	93.290	80	104		
Diagnosis								U	p
Depression-F33	13	92.385	2.873	90.648	94.121	86	96	28.5	0.023
Depression-F31	10	96.600	4.274	93.543	99.657	91	104		
Total	23	94.217	4.067	92.459	95.976	86	104		

Group					
			Patients	Control	Total
MCV level	Normal	Count	9	18	27
		%	39.1%	78.3%	58.7%
	High	Count	14	5	19
		%	60.9%	21.7%	41.3%
	Total	Count	23	23	46
		%	100.0%	100.0%	100.0%
Chi-Square	7.26				
p	0.007				

Patients' group					
		Sex	Female	Male	Total
MCV level	Normal	Count	5	4	9
		%	45.5%	33.3%	39.1%
	High	Count	6	8	14
		%	54.5%	66.7%	60.9%
	Total	Count	11	12	23
		%	100.0%	100.0%	100.0%
Chi-Square	0.354				
p	0.552				

Control group					
		Sex	Female	Male	Total
MCV level	Normal	Count	14	4	18
		%	93.3%	50.0%	78.3%
	High	Count	1	4	5
		%	6.7%	50.0%	21.7%
	Total	Count	15	8	23
		%	100.0%	100.0%	100.0%
Chi-Square	5.76				
p	0.016				

1. The mean laboratory value of the variable MCV in the examined blood tests of the patients routinely performed by the admission to hospital fell within the high value ranges and was x= 94.217 fl. (SD=4.06). The lowest MCV level was 86 fl., the highest 104 fl. The mean for the control group was

x=89.652 (SD=3.89), i.e. normal. The lowest MCV level in the control group was 80 fl., the highest 97 fl. Mean MCV values are markedly higher in patients with depressive disorders in comparison to healthy control group members – a result that is statistically significant, p<0.0003 (Table 2). The mean MCV level for female patients was x=93.18 (SD=4.09) compared to x=88.53 (SD=3.52) in the control group. The mean MCV level for male patients was x=95.16 (SD=3.97) compared to x=91.75 (SD=3.88) in the control group.

2. The percentages of the ranges of laboratory findings for MCV in the examined group of patients, in reference to the normal ranges as shown above were as follows: normal values were found in 39.1 % of the patients, elevated MCV levels were observed in 60.9%. In the control group, normal values were found in 78.3 % of its members, while elevated MCV levels were observed only in 21.7 %. A statistically significant result was obtained in the chi-square independence test, chi-square = 7.26 (p<0.007): MCV level differentiates the patients from the control group, i.e. abnormal, elevated, high MCV levels are much more common in patients with depressive disorders than in healthy control group members (Table. 2).

ANALYSIS OF INTERRELATIONS BETWEEN HOMOCYSTEINE LEVEL AND SOCIODEMOGRAPHIC VARIABLES AND DIAGNOSIS

1. On dividing the group according to sex, the following results were obtained: normal homocysteine levels were found in 81.8% of the female patients and only in 33.3% male patients suffering from depression, while elevated homocysteine levels were found in as many as 66.7% of male patients and only in 18.2% of female patients (chi-square=5.49, p<0.019). 100.0% of female and 75.0% of male control group members had normal homocysteine levels, and only 25.0% had the elevated ones. Conclusion: homocysteine levels were markedly higher in male than in female patients (p<0.019). In the control group, homocysteine levels were slightly higher in men than in women (p<0.043) (Table 1).

2. A significant relation between age and homocysteine level was observed in the group of patients (p<0.045). The older the patients the higher their homocysteine levels. This correlation failed to be significant in the control group (p=0.396), age did not affect homocysteine levels.

3. On dividing the group according to the patients' diagnoses – F33 or F31 – the mean homocysteine value for recurrent depression (F33) was x=10.56 (SD=4.84), i.e. normal, and for the depressive phase in bipolar affective disorder (F31) x=13.04 (SD=3.37), i.e. elevated > 12.42 umol/l. The Mann-Whitney U test for small samples demonstrated a tendency of homocysteine to differ according to diagnosis, U=35,000, p=0.063. This interesting result requires further research including more participants and a continuation of this study.

ANALYSIS OF INTERRELATIONS BETWEEN MCV LEVEL AND SOCIODEMOGRAPHIC VARIABLES AND DIAGNOSIS.

1. On dividing the group according to sex, the following results were obtained: normal MCV levels were found in 45.5 % of the female patients and only in 33.3% male patients suffering from depression, while elevated, high MCV levels were found in as many as 66.7% of male patients and in 54.5 % of female patients (chi-square=0.354, p<0.552). Conclusion: correlations between MCV levels of female and male patients were not significant in the group of patients. 93.3 % of female and 50.0 % of male control group members had normal MCV levels, and only 6.7 % of female and 50.0 % of male elevated. In the control group, MCV levels were markedly higher in male than in female patients (p<0.016).

2. A significant relation between age and MCV level was observed in the group of patients ($p<0.013$). The older the patients the higher their MCV levels. This correlation failed to be significant in the control group ($p=0.39$), age did not affect MCV levels.

3. On dividing the group according to the patients' diagnoses – F33 or F31 – the mean MCV value for recurrent depression (F33) was $x=92.38$ ($SD=2.87$), i.e. normal, and for the depressive episode in bipolar affective disorder (F31) was $x=96.60$ ($SD=4.27$), i.e. elevated >93 fl. The Mann-Whitney U test for small samples demonstrated a significant tendency of MCV to differ according to diagnosis, $U=28.5$, $p<0.023$. This interesting result requires further research including more participants and a continuation of this study (Table 2).

DISCUSSION

Elevated mean homocysteine and MCV values in the group of patients compared to the control group obtained in this study suggest a relation between depressive disorders and folic acid and/ or vitamin B12 deficiencies, especially folic acid deficiency whose indicator is homocysteine. The content of these vitamins is also apparent in the blood count, i.e. in MCV (4). Low intake of folic acid may be a risk factor for depression (2, 7, 10, 15). Elevated homocysteine levels were found in as many as 43.5% of the patients and only in 8.7% of the control group members. The difference was statistically significant – $p<0.007$. And in 60.9% of the patients whose MCV was measured, its levels were above normal, too ($p<0.007$). Elevated results were consistent with the observations of other authors, who had also noted low levels particularly of folic acid, or vitamin B12, and elevated homocysteine levels in depressive patients (5, 8, 9, 11, 12). This, however, poses the question whether the observed elevated homocysteine and MCV levels correlate with the course of depressive disorders, and how it affects treatment, potential antidepressant resistance and the time needed for clinical improvement. Results obtained in this respect by other authors (2, 7, 9) seem very promising. The observed deficiencies of the mentioned vitamins are related to antidepressant resistance in patients with affective disorders, a prolonged period of treatment and worse clinical improvement, while using vitamins (folic acid, vitamin B12) as part of the treatment effects a faster and better clinical improvement as well as prevents relapses. Those vitamins play an important role in the human body because they participate in the metabolism of S-adenosyl-L-methionine (SAM), which, as a donator of methyl groups, is crucial to the functioning of the nervous system (6). The effect of folic acid on membrane phospholipids in neurons is also symptomatic. Many articles show that the prevalence of these deficiencies in depressive patients is meaningfully higher than in healthy members of control groups (2, 7, 9, 14). The results showing a markedly higher number of male patients with elevated homocysteine levels, as opposed to female patients, seem interesting ($p<0.019$). 81.8% of female and only 33.3% of male patients suffering from depression had normal homocysteine levels, while only in 18.2% of female and as many as 66.7% of male patients elevated homocysteine levels were observed. These differences have also been noted by other authors, especially in men suffering from depression – both in recurrent depressive disorder and in bipolar affective disorder (5, 12, 14). This is possibly related to the disease rather than, e.g., abuse of alcohol, which is more common among men because the exclusion criteria to the study was alcohol abuse. The increase in homocysteine and MCV with age was also observed. The older the patients the higher their homocysteine levels ($p<0.045$) and MCV parameter values ($p<0.013$). This correlation failed to be significant in the control group ($p=0.396$). The comparison of the diagnoses – F33 or F31 – and the mean values for homocysteine and MCV parameter offered interesting results (which, however, must be confirmed by further research on a larger group of patients) – higher homocysteine

levels tend to be found in the depressive episode of bipolar affective disorder (F 31). But the Mann-Whitney U test for small samples demonstrated a significant relation of MCV to differ according to diagnosis, U=28.5, p<0.023. Higher MCV levels were observed in the depressive episode (phase) of bipolar affective disorder (F 31). It may be concluded that using folic acid and vitamin B12 in depression treatment in uni-and bipolar affective disorders in patients with deficiencies of those vitamins remarkably improves the prognosis, quickens clinical improvement and enhances a faster reaction to antidepressant, normothymic and neuroleptic drugs.

CONCLUSIONS

1. Markedly elevated mean values for homocysteine (p<0.003) and MCV (p<0.0003) were found in patients with depressive disorders in comparison with the control group.
2. In 43.5% of the patients compared to 8.7% of the control group, the homocysteine levels were elevated (p<0.01).
3. Elevated homocysteine level was found in 60.9% of the patients compared to 21.7% of the control group (p<0.01).
4. Significantly higher homocysteine levels were observed in male patients as opposed to female patients (p<0.01).
5. The older the patients the higher their homocysteine level (p<0.05) and MCV level (p<0.01).
6. There was a tendency for homocysteine levels to differ according to the diagnosis: higher levels of homocysteine were observed in patients in the depressive phase of bipolar affective disorder.
7. There was a statistically significant relation between MCV level and the diagnosis: there were higher MCV levels in the depressive episode of bipolar affective disorder (p<0.02).

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SUMMARY

In recent years, there has been a growing worldwide interest in the relation between a national diet and the possibility of developing such mental disorders as depression, dementia, Alzheimer's disease, and schizophrenia, as well as between deficiency of such vitamins as, e.g., folic acid, vitamin B12, or others, and the functioning of the human brain. The levels of such vitamins as folic acid or vitamin B12 are reflected in some of the hematologic parameters, e.g. MCV and homocysteine. Elevated homocysteine level is regarded to be a risk factor in the development of atheroma; also, the connection between homocysteine, folic acid, vitamin B12 and affective disorders, particularly depression, seems to be intriguing. The aims of this study were: 1. to compare homocysteine and MCV levels in depressed patients in the course of unipolar and bipolar affective disorders and the healthy control group members, 2. to look for connections between serum homocysteine and MCV levels and sociodemographic data (age, sex) in the group of patients and control group. Participants included 46 people: 23 patients and 23 healthy people. 23 patients (11 females, 12 males) were hospitalized with diagnosed depressive episode in the course of unipolar – F33 (13 patients), or bipolar – F31 (10 patients) affective disorders according to ICD-10, in the Neuropsychiatric Hospital in Lublin. The average age in the group was 50.64 years for women (SD=7.61), and 49.25 years for men (SD=10.85). The control group consisted of 23 healthy people chosen to match the patients with regard to sex and age. The average age in the control group was 45.67 for women (SD=7.53), and 46.12 for men (SD=10.19). Methods we used: 1. sociodemographic questionnaire and medical records, 2. BDI for measurement of depression, 3. results of blood tests of the patients of the psychiatric ward routinely performed by the admission to hospital for the analysis of MCV, 4. for the analysis of homocysteine serums of the patients and control group. Conclusions: 1. Markedly elevated mean values for homocysteine ($p<0.003$) and MCV ($p<0.0003$) were found in patients with depressive disorders in comparison with the control group 2. In 43.5% of the patients compared to 8.7% of the control group, the homocysteine levels were elevated ($p<0.01$). 3. Elevated homocysteine level was found in 60.9% of the patients compared to 21.7% of the control group ($p<0.01$). 4. Significantly higher homocysteine levels were observed in male patients as opposed to female patients ($p<0.01$).

5. The older the patients the higher their homocysteine level ($p<0.05$) and MCV level ($p<0.01$). 6. There was a tendency for homocysteine levels to differ according to the diagnosis: higher levels of homocysteine were observed in patients in the depressive phase of bipolar affective disorder. 7. There was a statistically significant relation between MCV level and diagnosis: there were higher MCV levels in the depressive episode of bipolar affective disorder ($p<0.02$).

Czy depresja w przebiegu chorób afektywnych wiąże się z nieprawidłowymi poziomami homocysteiny i MCV?

W ostatnich latach wzrasta liczba badań na temat związków pomiędzy homocysteiną, kwasem foliowym, witaminą B12 a takimi chorobami psychicznymi, jak depresja, otępienia, choroba Alzheimera, schizofrenia, także pomiędzy niedoborami takich witamin, jak np. kwas foliowy czy wit. B12 i in. a funkcjonowaniem ludzkiego mózgu. Stężenia takich witamin, jak kwas foliowy i wit. B12, znajdują swoje odbicie w niektórych parametrach morfologii krwi, np. MCV i homocysteinie. Zwiększone poziomy homocysteiny są odnotowywane nie tylko jako czynnik ryzyka rozwoju miażdżycy, ale także interesujące wydają się powiązania homocysteiny z zaburzeniami afektywnymi, a w szczególności z depresją. Celem pracy było: 1) porównanie poziomów homocysteiny i MCV w grupie pacjentów z depresją w przebiegu zaburzeń afektywnych jedno- i dwubiegunowych i zdrową grupą kontrolną, 2) poszukiwanie związków pomiędzy poziomami homocysteiny (w surowicy) i wartościami MCV a danymi socjodemograficznymi (wiekiem, płcią) w grupie pacjentów oraz grupie kontrolnej. Badaną grupę stanowiły łącznie 46 osób: 23 pacjentów oraz 23 zdrowe osoby. 23 pacjentów (11 kobiet, 12 mężczyzn) hospitalizowanych było w Szpitalu Neuropsychiatrycznym w Lublinie z rozpoznaniem epizodu depresji w przebiegu zaburzeń afektywnych jednobiegunowych – F 33 (13 osób) oraz dwubiegunowych – F 31 (10 osób) zgodnie z ICD-10. Średnia wieku w badanej grupie wynosiła odpowiednio dla kobiet 50,64 lat (SD=7,61), dla mężczyzn 49,25 lat (SD=10,85). Grupę kontrolną stanowiły 23 zdrowe osoby dobrane pod względem płci i wieku. Średnia wieku w grupie kontrolnej wynosiła odpowiednio dla kobiet 45,67 lat (SD=7,53), dla mężczyzn 46,12 lat (SD=10,19). Wykorzystaliśmy: 1) kwestionariusz socjodemograficzny i historie chorób, 2) Inwentarz BDI do mierzenia depresji, 3) do analizy parametru MCV wyniki morfologii krwi pacjentów oddziałów psychiatrycznych, rutynowo pobieranej przy przyjęciu do szpitala, 4) do analizy homocysteiny surowice pacjentów i osób z grupy kontrolnej. Wnioski: 1. Odnotowano istotnie wyższe wartości średnich dla homocysteiny ($p<0,003$) oraz MCV ($p<0,0003$) u pacjentów z zaburzeniami depresyjnymi w porównaniu z grupą kontrolną. 2. W odniesieniu do poziomu homocysteiny u 43,5 % pacjentów stwierdzono jej wartości powyżej normy laboratoryjnej w porównaniu z 8,7 % grupy kontrolnej ($p<0,01$). 3. W grupie pacjentów u 60,9% osób odnotowano podwyższony poziom MCV w porównaniu z 21,7% grupy kontrolnej ($p<0,01$). 4. W grupie pacjentów mężczyźni prezentowali zdecydowanie wyższe poziomy homocysteiny od kobiet ($p<0,01$). 5. Im wyższy wiek, tym wyższy był poziom homocysteiny ($p<0,05$) i wyższy poziom MCV ($p<0,01$) w grupie pacjentów. 6. Obserwowano tendencję do różnych wartości poziomu homocysteiny w zależności od rozpoznania klinicznego: wyższe wartości odnotowano u pacjentów w fazie depresyjnej choroby afektywnej dwubiegunowej. 7. Stwierdzono statystycznie istotną zależność między poziomem MCV a rodzajem rozpoznania: wyższe poziomy MCV osiągnęli pacjenci w epizodzie depresyjnym w przebiegu zaburzeń afektywnych dwubiegunowych ($p<0,02$).