

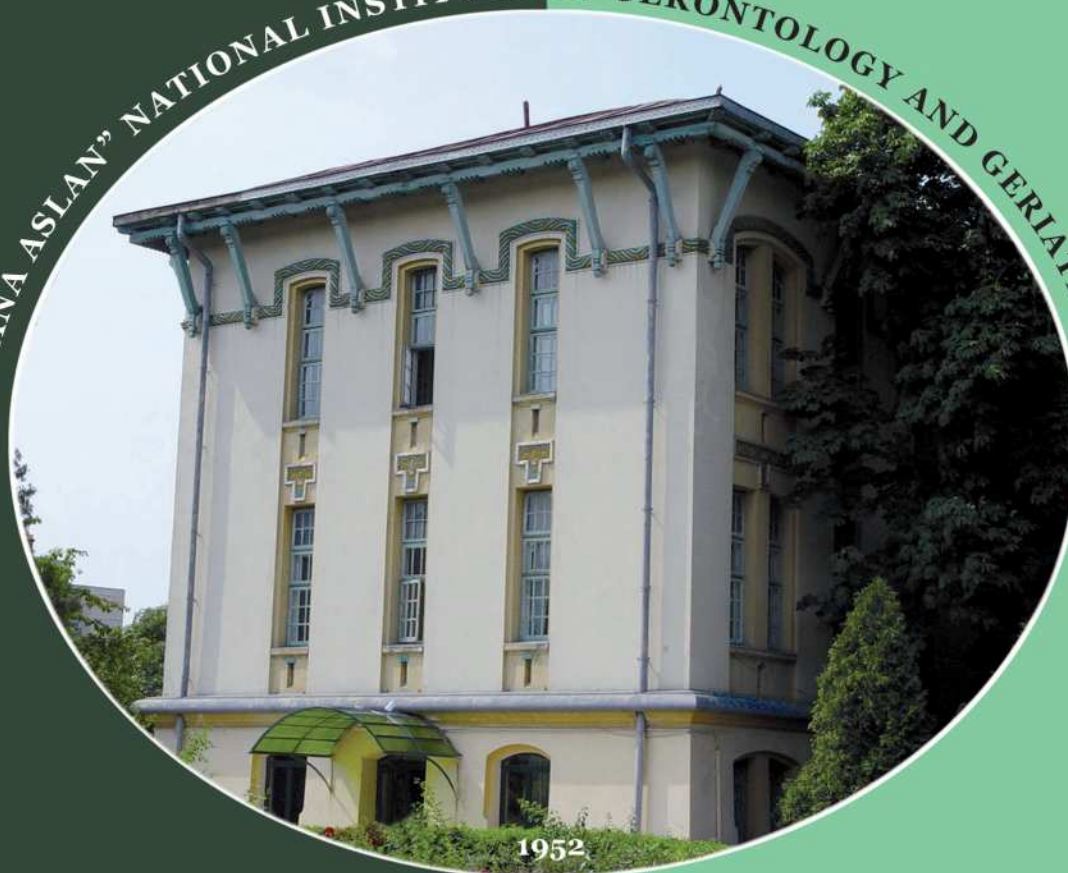


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INTERCONNECTION BETWEEN DYSLIPIDEMIA, ATHEROGENICITY AND TYPE 2 DIABETES MELLITUS

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Abstract. Lipid metabolism disorders, in time triggers atherogenicity and thereby increases the risk of developing diabetes mellitus type 2 (DM) and its cardiovascular complications. The purpose of the study was to establish the correlation between lipid changes and atherogenic indices in senescent DM patients and to evaluate the utility of atherogenic index as risk predictor. The research was done on 69 patients: 41 DM and 28 healthy control patients, over 65 years old. Data revealed an increase of triglycerides, cholesterol, LDL-cholesterol, non-HDL-cholesterol ($p<0.001$; $p<0.05$; $p<0.05$; $p<0.001$), and a decrease of HDL-cholesterol ($p<0.0001$) at DM patients vs. control. Also, we noticed a significant increase of all atherogenic indices ($p<0.0001$) in DM patients vs. control. Prevalence of dyslipidemia at DM patients increased from 28.57% in the low risk atherogenic index group to 73.91% in the high risk atherogenic index group. Linear regression equation revealed for glucose (as well as for glycated haemoglobin), a significant positive correlation with atherogenic status and a significant negative correlation with HDL-cholesterol. On the other hand, non-HDL-cholesterol is positively correlated with glucose ($p<0.05$) and all atherogenic indices ($p<0.0001$). Diagnostic test evaluation for atherogenic index indicated the following: 72.79% assay accuracy, 82.93% sensitivity, 57.14% specificity and relative risk estimate=2.42. Multivariate logistic regression analysis showed that patients with high atherogenic index had 6.47-fold risk for DM [OR 6.47, 95% CI: 2.14-19.56; $p=0.0009$]. Consequently, the higher is atherogenic index, the higher are the chances to develop DM. In conclusion, besides routine lipid panels, prevention strategies should include, as alternative method to assess DM and dyslipidemia, atherogenic index as a good risk predictor. Also, non-HDL-cholesterol should be taking into account in treatment guidelines and management of DM.

Key words: type 2 diabetes mellitus, atherogenic index, senescent patients

INTERRELAȚIA DINTRE DISLIPIDEMIE, ATEROGENICITATE ȘI DIABETUL ZAHARAT TIP 2

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Rezumat. Tulburările metabolismului lipidic, în timp duc la declanșarea aterogenității crescând astfel riscul apariției diabetului zaharat de tip 2 (DM) și complicațiilor cardiovasculare ale acestuia. Scopul studiului a fost de a stabili corelația dintre schimbările lipidice și indicii aterogenici la pacienții senescenti cu DM și de a evalua utilitatea indexului aterogenic, ca predictor de risc. S-au luat în studiu 69 de pacienți: 41 pacienți cu DM și 28 pacienți control sănătoși, cu vârste peste 65 de ani. Datele evidențiază o creștere a trigliceridelor, colesterolului, LDL-colesterolului, non-HDL-colesterolului ($p<0.001$; $p<0.05$; $p<0.05$; $p<0.001$) și o scădere a HDL-colesterolului ($p<0.0001$) la pacienții cu DM față de control. De asemenea, am observat o creștere semnificativă a tuturor indicilor aterogeni ($p<0.0001$) la pacienții cu DM față de control. Prevalența dislipidemiei la pacienții cu DM a crescut de la 28.57% în grupul cu index aterogenic cu risc scăzut la 73.91% în grupul de index aterogenic cu risc ridicat. Ecuația de regresie liniară pentru glucoză (cât și pentru hemoglobina glicată), arată o corelație pozitivă semnificativă cu statusul aterogenic și o corelație negativ semnificativă cu HDL-colesterolul. Pe de altă parte, non-HDL-colesterolul se corelează pozitiv cu glucoza ($p<0.05$) și cu toți indicii aterogeni

($p < 0.0001$). Evaluarea testului de diagnostic pentru indexul aterogenic a indicat următoarele: 72.79% precizie a testului, sensibilitate 82.93%, specificitate 57.14% și estimarea riscului relativ=2.42. Analiza logistică de regresie multivariată a arătat că pacienții cu index aterogenic ridicat au avut un risc de 6,47 ori mai mare pentru DM [OR 6.47, CI 95%: 2.14-19.56; $p = 0.0009$]. Prin urmare, cu cât este mai mare indexul aterogenic, cu atât sunt mai mari șansele de a dezvolta DM. În concluzie, pe lângă panelul lipidic de rutină, strategiile de prevenție ar trebui să includă, ca metodă alternativă de evaluare a DM și dislipidemie, indexul aterogenic ca un bun predictor de risc. De asemenea, non-HDL-colesterolul ar trebui luat în considerare în ghidurile de tratament și în managementul DM.

Cuvinte cheie: diabet zaharat tip 2, indice aterogenic, pacienți senescenti

INTRODUCTION

Atherogenic lipid profile is commonly seen in diabetes mellitus type 2 (DM) and also in metabolic syndrome. The major risk factor are lipid abnormalities development and the common changes is dyslipidemia, characterized by increased cholesterol, triglycerides, LDL-cholesterol and decreased HDL-cholesterol and also changes in LDL composition that triggers endothelial dysfunction [1].

Numerous studies have shown that the ratio of triglycerides/ HDL-cholesterol (TG/HDL) is a strong predictor of heart attack. An abnormal report indicates an atherogenic lipid profile and a risk of developing myocardial infarction [2]. Atherogenic index (AI) reflects atherogenic potential of full lipoprotein fractions spectrum and has been described as a biomarker of plasma atherogenicity [3-5]; good predictor, very valuable and useful for assessing atherogenic risk. Sharaye et al. [6] confirmed the statistical reliability of AI as a tool in the assessment of cardiovascular risk factors among non-obese adults.

Non-HDL-cholesterol encompasses all of the atherogenic apolipoprotein B (apoB)-containing lipoproteins (LDLC, very low-density lipoprotein cholesterol, intermediate-density lipoprotein cholesterol, lipoprotein (a), chylomicrons, and their triglyceride (TG)-rich remnants) [7]. Also is more practical, reliable, and inexpensive and is accepted as a surrogate marker for apo B in routine clinical practice [1]. Moreover, International Atherosclerosis Society [8] and National Lipid Association [9] support non-HDL-cholesterol as the major form of atherogenic cholesterol and primary

therapeutic target in the management of dyslipidemia.

Therefore, the purpose of the study was to establish the correlation between lipid changes and atherogenic indices in senescent DM patients and to evaluate the utility of atherogenic index as risk predictor.

MATERIALS AND METHODS

Subjects

Observational cross-sectional study was conducted among 69 patients, over 65 years old, hospitalized in National Institute of Gerontology and Geriatrics „Ana Aslan”. We compared 41 DM patients with 28 healthy control patients. The subjects' selection for the study was made respecting the exclusion and inclusion criteria that were initially set. Exclusion Criteria: Patients with co-morbid conditions which may affect the values of the laboratory parameters of the study: like hormone-related disorders, stroke, acute and chronic inflammatory state, neoplasia, and liver dysfunction. Written informed consent was obtained from all the study participants prior to their enrollment.

Atherogenic indices was calculated from lipid serum panel: Atherogenic Coefficient as ratio Total C-HDL/HDL; Castelli Risk Index I as ratio Total C/HDL; Castelli Risk Index II as ratio LDL/HDL; Atherogenic Index (AI) as $\log(TG/HDL)$. AI values are associated with: low risk $-0.3 \div 0.1$; medium risk $0.1 \div 0.24$ and high risk above 0.24.

Non-HDL-cholesterol was calculated as the difference between total cholesterol and HDL-cholesterol.

Blood samples were taken from all participants after 12-14 hours fasting, by

venopuncture into vacutainers without anticoagulant. Lipid serum profile (total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides) was assayed using commercial laboratory kits on automated analyzer Konelab 301 SC.

Statistical analysis

Data were collected and statistically analyzed. Graphs and tables are generated with Microsoft Word and Excel program. For quantitative values, results were expressed as means $\pm$ S.D. The general characteristics of patients were compared using Student's "t" test for continuous variables. Pearson test was used to compare categorical variables. The odds ratios (OR) and their 95% confidence intervals (CI) were estimated by multivariable logistic regression analyses.

In all calculations, $p < 0.05$ was considered as statistically significant level.

RESULTS

Present cross-sectional study revealed for DM patients, an incidence of cardiovascular disease of 85.36%, depressive / anxiety disorders of 24.39%, cognitive disorders 19.51% and osteoporosis is present in 28% of women with diabetes.

As seen in Tab. I, the values of cholesterol, LDL-cholesterol, triglycerides, non-HDL-cholesterol were found to be significantly higher in DM patients than in control group ($p < 0.05$; $p < 0.05$; $p < 0.0001$; $p < 0.001$). In contrast, serum HDL-cholesterol levels ($p < 0.0001$) were significantly low in DM patients when compared to control.

Tab. I Characteristics of the study patients

	Control patients (n=28)	Diabetes mellitus patients (n=41)
Age (years)	65.82 $\pm$ 11.72	68.97 $\pm$ 7.22
Glucose (mg/dl)	88.32 $\pm$ 12.56	174.53 $\pm$ 52.93 ^{***}
Cholesterol (mg/dl)	177.5 $\pm$ 21.79	193.60 $\pm$ 46.97 [*]
HDL-Cholesterol (mg/dl)	58.92 $\pm$ 9.05	43.90 $\pm$ 12.02 ^{***}
LDL-Cholesterol (mg/dl)	101.69 $\pm$ 19.12	115.18 $\pm$ 41.83 [*]
Triglycerides (mg/dl)	84.25 $\pm$ 27.11	169.75 $\pm$ 106.75 ^{***}
Non-HDL-Cholesterol (mg/dl)	118.57 $\pm$ 19.29	149.70 $\pm$ 51.41 [†]

Results are presented as means $\pm$ S.D.; $p^* < 0.05$ vs. C; $p^{**} < 0.01$ vs. C; $p^{***} < 0.0001$ vs. C; $p^† < 0.001$ vs. C

Our study also observed for all atherogenic indices (Tab. II) a statistically significant increase ($p < 0.0001$) in patients with DM vs. control. Besides, AI has a value well above 0.24, which means a particularly

high cardiovascular risk for patients with diabetes.

Tab. II Atherogenic indices at diabetes mellitus patients vs. Control

	Control patients (n=28)	Diabetes mellitus patients (n=41)
Atherogenic coefficient	2.05 $\pm$ 0.49	3.78 $\pm$ 1.94 [*]
Castelli Risk Index I	3.05 $\pm$ 0.49	4.72 $\pm$ 2.04 [*]
Castelli Risk Index II	1.75 $\pm$ 0.43	2.86 $\pm$ 1.43 [*]
Atherogenic index	0.25 $\pm$ 0.26	0.88 $\pm$ 0.70 [*]

Results are presented as means $\pm$ S.D.; $p^* < 0.0001$ vs. C

The prevalence of dyslipidemia, as seen in Tab. III, showed that DM patients have elevated serum cholesterol levels, high LDL-cholesterol and high triglycerides 100% vs. control and HDL cholesterol low 100% control. Compared to the control group,

atherogenic risk is high in 73.91% diabetes patients vs. 26.08%. Thus, the prevalence of dyslipidemia in patients with diabetes increases from 28.57% for the low-risk group, to 73.91% for the high-risk group.

Tab. III Prevalence of dyslipidemia among diabetes mellitus patients vs. Control

Parameters	Diabetes mellitus patients (%)	Control patients (%)	Total
Cholesterol (mg/dl)			
<200 (desirable)	22 (47.82)	24 (52.17)	(46)
200-239 (borderline)	10 (71.42)	4 (28.57)	(14)
>240 (high)	9 (100)	0 (0)	(9)
HDL-Cholesterol (mg/dl)			
≤40 (low)	18 (94.73)	1 (5.26)	(19)
>40 (high)	23 (46)	27 (54)	(50)
LDL-Cholesterol (mg/dl)			
<129 (desirable)	24 (47.05)	27 (52.94)	(51)
130-159 (borderline)	10 (90.90)	1 (9.09)	(11)
160-189 (high)	7 (100)	0 (0)	(7)
Triglycerides (mg/dl)			
<150 (desirable)	23 (46)	27 (54)	(50)
150-199 (borderline)	4(80)	1 (20)	(5)
200-499 (high)	14 (100)	0 (0)	(14)
Atherogenic index			
-0.3-0.1 (low risk)	4 (28.57)	10 (71.42)	(14)
0.11-0.24 (medium risk)	3 (33.33)	6 (66.66)	(9)
>0.24 (high risk)	34 (73.91)	12 (26.08)	(46)

Tab.IV Correlation of glucose and glycated haemoglobin (HbA1c) with clinical parameters at DM patients

	Glucose		HbA1c	
	r	p	r	P
Glucose (mg/dl)	-	-	0.806	<0.00001
HbA1c (%)	0.806	<0.00001	-	-
Cholesterol (mg/dl)	0.247	0.119	0.125	0.436
HDL-Cholesterol (mg/dl)	-0.433	<0.01	-0.393	<0.01
LDL-Cholesterol (mg/dl)	0.063	0.695	0.001	0.995
Triglycerides (mg/dl)	0.674	<0.00001	0.480	<0.001
Atherogenic coefficient	0.472	<0.01	0.351	<0.05
Castelli Risk Index I	0.452	<0.01	0.342	<0.05
Castelli Risk Index II	0.271	0.086	0.197	0.216
Atherogenic index	0.283	0.072	0.205	0.198
Non-HDL-Cholesterol (mg/dl)	0.327	0.036	0.203	0.202

r= Pearson correlation coefficient; significant at p<0.05

From the bivariate correlation (Tab. IV), by Pearson coefficient, linear regression equations at DM patients revealed the following:

- A significant positive correlation of glucose with: glycated haemoglobin, triglycerides, atherogenic coefficient, Castelli risk index I and non-HDL-cholesterol;
- A significant negative correlation of glucose with HDL-cholesterol;

- A significant positive correlation of glycated haemoglobin with: triglycerides, atherogenic coefficient and Castelli risk index I;

- A significant negative correlation of glycated haemoglobin with HDL-cholesterol.

As for non-HDL-cholesterol (see Fig. 1 and Fig. 2), we found a significant positive correlation with glucose ($r=0.327$; $p<0.05$) and respectively all atherogenic indices ($p<0.00001$).

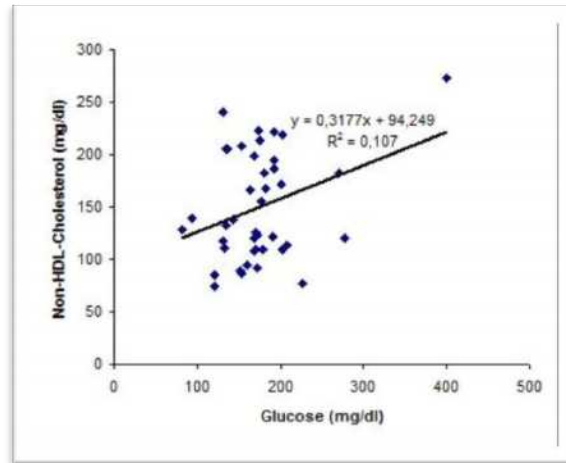


Fig. 1 Correlation between non-HDL-cholesterol and glucose at DM patients
Curve fitting was by linear regression; r = correlation coefficient

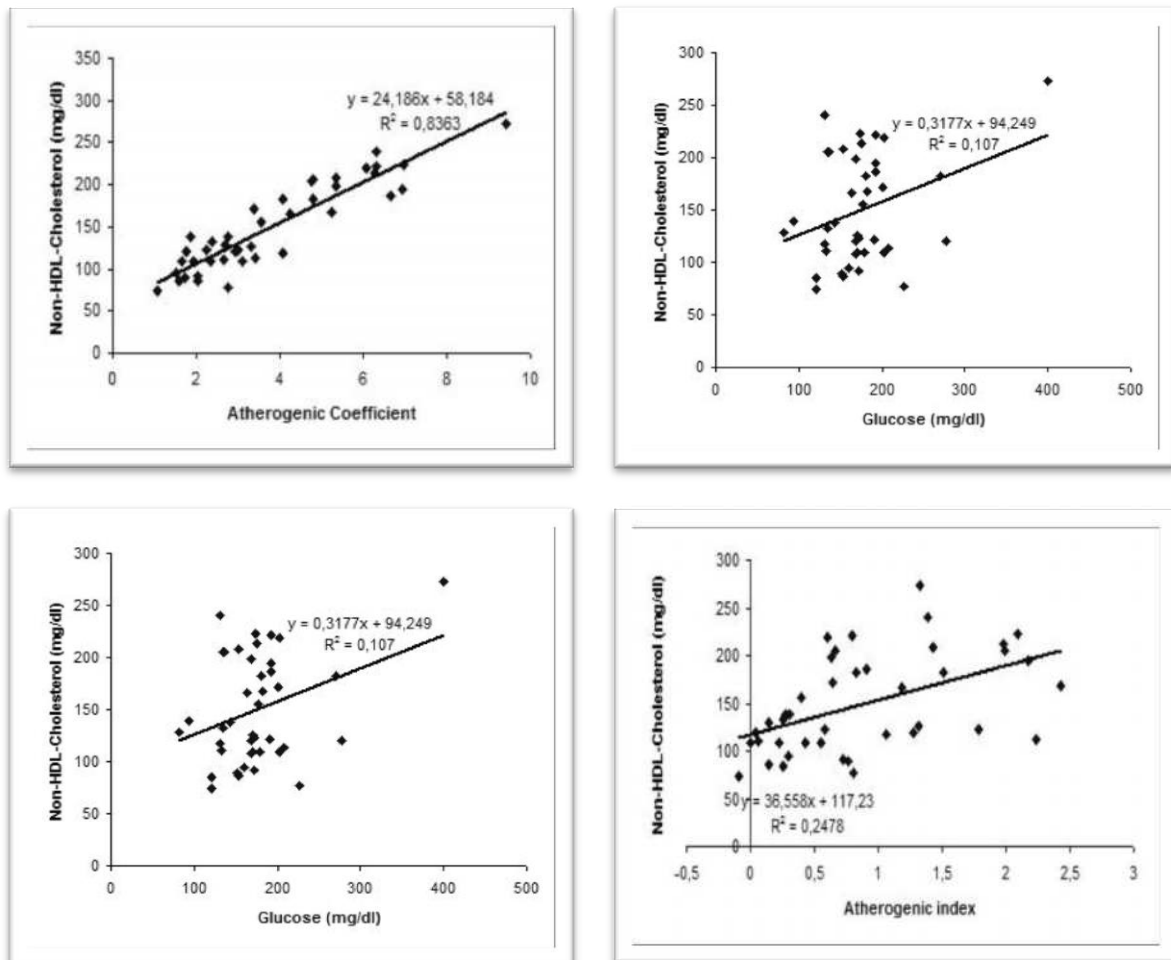


Fig. 2 Correlation between non-HDL-cholesterol and atherogenic indices at DM patients
Curve fitting was by linear regression; r = correlation coefficient

Diagnostic test evaluation for atherogenic index indicated the following: 72.79% assay accuracy, a sensitivity of 82.93% and a specificity of 57.14%. The relatively

estimated risk is 2.42, which means there is a strong correlation between diabetes and AI.

Multivariate logistic regression analysis showed that, compared to patients with low AI, patients with increased AI have a 6.47 times greater risk of having diabetes. Thus, the confidence interval of 95% for odds ratios [OR 6.47, 95% CI: 2.14-19.56; $p = 0.0009$] indicates that the chances that a patient with high AI are much higher to have diabetes compared to those with low AI.

DISCUSSION

Modifications of lipid metabolism in DM could be due to insulin resistance/deficiency that intervenes in regulation of lipoprotein lipase, apolipoprotein production and other key enzymes. The most relevant abnormalities found in DM are dyslipidemia, which is characterized by, what is been called, “the lipid triad”: high cholesterol, high LDL-cholesterol and low HDL-cholesterol. Present study confirms all these lipid changes in DM patients. Our results reflect the fact that lipid abnormalities are the major contributors in DM development and are in agreement with recent research works [10-12].

Lipid metabolism disruptions lead to changes in atherogenic status consequently to high risk AI [4, 10, 13, 14]. Previous studies have shown that is possible, in some cases, that serum lipid parameters could be in normal range or slightly increase and therefore cannot provide sufficient information about atherogenic risk [11, 12, 15]. And that is why, it is suggested that atherogenic indices, especially AI, can be a better alternative and more reliable in the management of disease. Our study observed, for all atherogenic indices, a significant increase in patients with DM, which is in accordance with other studies [10, 11, 12, 14, 16, 17]. Moreover, from our diagnostic test evaluation and multivariate logistic regression analysis it appears that there is a strong correlation between DM development, diabetic dyslipidemia and AI. Nimmamapalli HD et al. [12] and Ranjit PM et al. [11] found that lipid ratios

contribute significantly to the estimation of cardiovascular risk in DM patients especially when the absolute values of lipid profile seem normal or not markedly deranged. The results of Zhu XW et al. [14] suggests that AI may be more closely associated with the risk of DM. Same, Hussein TA et al. [17] concluded that AI could be used as a marker for predict cardiovascular diseases in DM patients.

Dyslipidemia is common in diabetes and there is strong evidence that cholesterol lowering improves cardiovascular outcomes, even in patients with apparently unremarkable lipid profiles [18]. Severe dyslipidemia can cause health complications as stroke, myocardial infarction which is the most common complication of DM. Causes of dyslipidemia could be: genetic, lifestyle, other secondary causes and/or a combination of these. Advancing age is also a risk factor too. In Diabetes Control and Complications Trial [19], it was shown that the severity of retinopathy was associated with increases in serum triglycerides and inversely associated with HDL-cholesterol levels. There is also evidence of hypercholesterolemia involvement in the formation of harsh exudates in the diabetic retina, with possible adverse effects on disease progression. Okpa HO et al. [16] showed that patients with DM have more dyslipidemia and higher AI risk. In our study, the prevalence of dyslipidemia in patients with diabetes increases from 28.57% for the low-risk group, to 73.91% for the high-risk group

It is indicated that non-HDL cholesterol and lipid ratios, including Castelli risk I and Castelli risk II, are cardiovascular disease risk indicators with better predictive assessment for atherosclerotic progression or regression compared with conventional lipid profile [7, 20, 21]. In his study, Peters AL [1] concluded that: “Current treatment guidelines consider non-HDL cholesterol to be an important CVD risk predictor and therapeutic target in patients with diabetic dyslipidemia.

Although non-HDL cholesterol is considered a secondary target of therapy, it is associated with increased CVD risk in patients with diabetes with hypertriglyceridemia, even if the LDL cholesterol goal of < 100 mg/dl has been reached. Appropriate attention to measuring, targeting, and treating non-HDL cholesterol in patients with diabetes can help to limit instances in which high-risk lipid profiles remain unrecognized and unaddressed.” We also found a strong correlation between non-HDL-cholesterol with all atherogenic indices.

Some limitations should be considered. The paper work is a cross-sectional analysis and cannot set a causal relationship. We study only senescent patients, not all age group are included. Differences in diet, lifestyle and demographic characteristics could affect AI values. Medications used, especially lipid-lowering drugs, could also interfere.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Peters AL. *Clinical Relevance of Non-HDL Cholesterol in Patients With Diabetes*. Clinical Diabetes 2008, 26, 1, 3-7.
- [2] Veerendra KA, Nutakki V, Ramarao J. *Dose-dependent Impacts on the Diagnostic Efficacies of Atherogenic Lipids in Adult Indian Smokers*. Journal of Clinical and Diagnostic Research 2011, 5, 7, 1352-1355.
- [3] Rasťova K, Dobiašova M, Hubáček JA, et al. *Association of metabolic and genetic factors with cholesterol esterification rate in HDL plasma and atherogenic index of plasma in a 40 years old Slovak population*. Physiol Res 2011, 60, 785–795.
- [4] Kanthe PS, Patil BS, Bagali S, et al. *Atherogenic index as a predictor of cardiovascular risk among women with different grades of obesity*. Inter J Coll Res Int Med&Public Health 2012, 4, 10, 1767-1774.
- [5] Dobiašova M, Frohlich J. *The plasma parameterlog (TG/HDL-C) as an atherogenic index: correlation with lipoprotein particle size and esterification rate in apoB-lipoprotein-depleted plasma (FER(HDL))*. Clin Biochem 2001, 34, 583–588.
- [6] Sharaye KO. *Association of atherogenic indices and abdominal obesity indices among non obese adults in Zaria, Northern Nigeria*. J of Physiol and Pathol 2015, 6(1), 1-5.
- [7] Puri R, Nissen SE, Shao M, et al. *Non-HDL Cholesterol and Triglycerides. Implications for Coronary Atheroma Progression and Clinical Events*. Arteriosclerosis, Thrombosis, and Vascular Biology 2016, 36, 2220–2228.
- [8] Grundy SM. *Expert Dyslipidemia Panel. An International Atherosclerosis Society Position Paper: global recommendations for the management of dyslipidemia*. J Clin Lipidol 2013, 7, 561–565.
- [9] Jacobson TA, Ito MK, Maki KC, et al. *National lipid association recommendations for patient-centered management of dyslipidemia: part 1–full report*. J Clin Lipidol 2015, 9, 129-169.

CONCLUSIONS

Till now, in DM patients, risk stratification comprise only traditional risk factors. But if we want a better diagnostic, prognostic and treatment management improving, additional risk factors must be included, among which atherogenic index and non-HDL-cholesterol have great potential as screening tools for dyslipidemia.

AI provides more reliable and accurate information about plasma atherogenicity, therefore it might be a strong marker in assessing atherogenic risk in DM senescent patients. However, longitudinal studies are needed to confirm whether AI maintains his prognostic capacity in long term.

For a better assessment of DM patients with/without cardiovascular complications could also be used non-HDL-cholesterol which is accepted as a marker of apoB in clinical practice.

In diabetic dyslipidemia patients, it is recommended to reduce atherogenic risk and treatment should also involve diet, exercise, lifestyle changes and other modifiable risk factors.

- [10] Adu EM, Ukwamedu HA, Oghagbon ES. *Assessment of Cardiovascular Risk indices in Type 2 Diabetes Mellitus*. Trop Med Surg 2015, 3, 2, 184-188.
- [11] Pusapati Madan Ranjit, Girija Sankar Guntuku, Ramesh Babu Pothineni. *Comparison of lipid profile and new atherogenic indices among the coronary artery disease (CAD)-negative and -positive diabetic dyslipidemia subjects*. International Journal of Medical Science and Public Health 2015, 4, 10, 1574-1578.
- [12] Harini Devi Nimmanapalli, Ambika Devi Kasi, Prabath Kumar Devapatla, Vani Nuttakki. *Lipid ratios, atherogenic coefficient and atherogenic index of plasma as parameters in assessing cardiovascular risk in type 2 diabetes mellitus*. Int J Res Med Sci 2016, 4(7), 2863-2869.
- [13] Atalay H, Büyük B, Değirmencioglu S, et al. *Effect of The Atherogenic Index of Plasma on Microvascular Complications Associated with Type 2 Diabetes Mellitus*. İstanbul Med J 2015, 16, 111-5.
- [14] Zhu XW, Deng FY, Lei SF. *Meta-analysis of Atherogenic Index of Plasma and other lipid parameters in relation to risk of type 2 diabetes mellitus*. Prim Care Diabetes 2015, 9(1), 60-7.
- [15] Siddiqui IA, Mariya LB, Rao JR. *Lipid indices in type II diabetes mellitus and their association with macro and micro vascular complications*. Int J Med J Res Health Sci 2013, 2(1), 87-92.
- [16] Henry Ohem Okpa, Ofem Egbe Enang, Emmanuel Edet Effa, Okon Ekwere Essien, Patrick Ntui Mbu. *Comparative Analysis Of Atherogenic Index Of Plasma And Its Relationship With Cardiovascular Risk Among Patients With Diabetes Mellitus And Concurrent Diabetes Mellitus With Hypertension Attending Endocrinology Clinic In A Tertiary Hospital South- South Nigeria*. Journal of Dental and Medical Sciences 2015, 14, 8, 102-107.
- [17] Tamara Ala`a Hussein and Zeinab M. Al-Rubaei. *Atherogenic Index of Plasma Levels in Patients with Diabetic and Neurodiabetic*. Kufa Journal for Nursing Sciences 2016, 6, 2, 1-7.
- [18] Schofield JD, Liu Y, Rao-Balakrishna P, Malik RA, Soran H. *Diabetes Dyslipidemia*. Diabetes Ther 2016, 7(2), 203–219.
- [19] Nathan DM, for the DCCT/EDIC Research Group. *The Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Study at 30 Years: Overview*. Diabetes Care 2014, 37(1), 9-16.
- [20] Zhang Y, Wu NQ, Li S, et al. *Non-HDL-C is a Better Predictor for the Severity of Coronary Atherosclerosis Compared with LDL-C*. Heart Lung Circ 2016, 25(10), 975-81.
- [21] Zhu CG, Zhang Y, Xu RX, et al. *Circulating non-HDL-C levels were more relevant to atherogenic lipoprotein subfractions compared with LDL-C in patients with stable coronary artery disease*. J Clin Lipidol 2015, 9(6), 794-800.

THE SHORT PHYSICAL PERFORMANCE BATTERY (SPPB) - A VALUABLE FRAILTY ASSESSMENT INSTRUMENT

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Abstract. Mobility is an essential ability for an independent life. Many clinicians prefer to diagnose frailty exclusively on physical aspects, which are more easily assessed and more focused on the actual functioning. In recent years, research literature shows the Short Physical Performance Battery (SPPB) as a valuable frailty assessment instrument. Our work shows the value of this new instrument, presenting the relations between frailty (SPPB) with chronic conditions, sensorial and socio-psychological functioning. 182 inpatients from NIGG, aged between 45 and 88 years ($X=68.49$ years) are evaluated using physical functioning tests (ADL, IADL and SPPB - a composite measure of standing balance, walking speed, sit-to-stand performance); also specific tests are used for sensory acuity, depression (GDS) and cognition (MMSE). In our sample, the frailty and pre-frailty weights are 25.3%, respectively 40.1%. Frailty increases with age ($r=-0.406/p=0.000$), it is linked to disability ($r=0.529/p=0.000$) and to higher co-morbidity ($r=-0.185/p=0.000$). The frailty state can alter the functioning of systems which ensure the mobility. So, SPPB correlates with circulatory chronic conditions ($r=-0.296/p=0.000$), neurological diseases ($r=-0.265/p=0.000$) and digestive ones ($r=0.207/p=0.005$). Also the sight and the hearing disorders can influence the mobility, generating frailty (for sight, $r=-.306/p=0.000$; for hearing, $r=-.289/p=0.000$). The correlations between SPPB and psycho-sensorial impairment reveal their importance in subjects' vulnerability. The link with depression (GDS) is high ($r=-0.468/p=0.000$) and the link with cognition (MMSE) is of medium intensity ($r=-0.342/p=0.000$). Conclusion: The Short Physical Performance Battery can be a valuable frailty assessment instrument, safe and easy to apply in preventive actions for a healthier life.

Key words: physical performance, frailty, mobility, balance, chronic pathology

BATERIA DE TESTE PENTRU PERFORMANȚA FIZICĂ (SPPB) - UN INSTRUMENT VALOROS DE EVALUARE A FRAGILITĂȚII

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Rezumat. Mobilitatea este o abilitate esențială pentru o viață independentă. Mulți clinicieni preferă diagnosticarea fragilității exclusiv prin aspecte fizice, care sunt mai ușor de evaluat și mai focalizate pe funcționalitatea de reală. În ultimii ani, literatura de specialitate prezintă bateria de teste pentru performanța fizică (SPPB) drept un instrument valoros de evaluare a fragilității. Lucrarea arată valoarea acestui test prezentând inter-relațiile existente între fragilitate (SPPB) cu unele boli cronice și cu funcționalitatea senzorială și psiho-cognitivă. 182 pacienți din INGG, cu vârste între 45-88 ani ($X=68.49$ ani) sunt evaluați prin teste de funcționalitate fizică (ADL, IADL și SPPB - evaluare compusă din teste de echilibru, viteza mersului, ridicări și așezări succesive), teste pentru acuitatea senzorială, depresie (GDS) și cogniție (MMSE). Ponderile de fragilitate și pre-fragilitate din lot sunt 25.3%, respectiv 40.1%. Fragilitatea mai frecventă la vârste mai avansate ($r=-0.406/p=0.000$) este legată de dizabilitate ($r=0.529/p=0.000$) și de multimorbiditatea crescută ($r=-0.185/p=0.000$). Starea de fragilitate poate altera funcționalitatea sistemelor care realizează mobilitatea. De exemplu, SPPB corelează cu afecțiunile circulatorii cronice ($r=-0.296/p=0.000$), bolile neurologice ($r=-0.265/p=0.000$) și cele

digestive ($r=0.207/p=0.005$). De asemenea tulburările de vedere și auz influențează mobilitatea generând fragilitate (corelațiile cu vederea, $r=-.306/p=0.000$; cu auzul, $r=-.289/p=0.000$). Legăturile dintre fragilitate (SPPB) și deficiențele psiho-senzoriale relevă importanța acestora în vulnerabilitatea subiecților. Corelația cu depresia (GDS) are intensitate înaltă ($r=-0.468/p=0.000$) iar cu cogniția (MMSE) este medie ($r=-0.342/p=0.000$). Concluzie: Bateria de teste pentru performanța fizică (SPPB) reprezintă un instrument valoros de evaluare a fragilității, sigur și relativ ușor de aplicat în acțiunile preventive pentru o viață mai sănătoasă.

Cuvinte cheie: performanță fizică, fragilitate, mobilitate, echilibru, patologie cronică

INTRODUCTION

Health dynamics in advanced ages is complex: in the last decades, average age has increased, but the healthy life expectancy did not increase proportionally, many elderly people living years with low overall functionality.

Mobility or the ability to move independently is essential for the person's autonomy and a key component of the quality of life. The concept of physical performance is the objectively measured ability to perform a task related to locomotion. It depends on the functionality of several systems: muscular and neuronal function, balance, osteo-articular integrity, cardiopulmonary function, resistance (at fatigue) [1]. The physical performance is close to the concept of functional ability formulated in 2015 by WHO [2]. Functional ability represents the combination between intrinsic capacity (including the physical and mental capacities of the person) and extrinsic capacity (represented by the living, social and physical environment) and the interaction between the two characteristics [2].

Similar ideas on functional ability are presented by Mark Lachs in his book "Treat Me, Not My Age". He talks about the living environment (that influences the functioning of the elderly) and the physiological reserve, which is equivalent to the intrinsic capacity mentioned above [3]. The physiological reserve consists of the excess of functional capacity at the level of organs and biological systems. This physiological reserve is innate and tends to decline with age. Its losses may go unnoticed without a functional decline. Examples: •90% of the existing renal functional reserve at birth can be lost without symptoms of renal failure; • the

brain has milliards of cells that will never be used and many can be lost or get sick before the person has a clear cognitive deficit; • muscle strength decreases with age and in the absence of muscle disease (the peak of muscle strength is between 20 and 30 years old) [3].

A healthy individual reaches the top of the physiological reserve around 25 years. After this moment, the reserve decreases due to physiological aging, chronic comorbidities, and risk factors. The human body has a great ability to adapt to various stressors; this adaptive capacity may fall below the threshold of decompensation. The phenotypic concept of this critical threshold is known as frailty [4].

The frailty does not yet have an internationally recognized standard definition.

Current debates were focused on defining it by using only the biomedical aspects or these together with the psycho-social ones. In 2015 WHO definition was: "*a gradual decline of physiological systems linked to age, that leads to a decrease in intrinsic capacity reserves; the decreases of this reserves gives extreme vulnerability to stress factors and increases the risk of adverse health effects*" [5].

The frailty can be seen as a transition phase between healthy aging and disability. In formulating a public health strategy on aging, WHO considers healthy aging in a holistic sense, based on the vision of functional perspectives and the course of life. So, the decreasing of intrinsic capacity may appear in middle age, before the onset of sarcopenia or the frailty. And so, the prevention must be started early in life.

The disability due to the chronic pathology of the elderly has an impact not only on the

sick persons, but also on the health systems sustainability.

“To decrease care dependency in older age, it will be necessary to realign all health care systems and services towards the objective of preventing decline in intrinsic capacity”, said Dr. Araujo de Carvalho (ICFSR-2018, Miami, Florida) [6].

In order to achieve a common framework for approaching frailty, the European Commission and 22 Member States financed by the Third European Health Programme of the European Union 2014-2020, the first Joint Action (JA) on the prevention of frailty: ADVANTAGE. The ADVANTAGE Report from 2017 provides an overview of frailty in the international and European context [7]. To diagnose the frailty, ADVANTAGE Consortium recommends opportunistic screening to all people over the age of 70 when addressing a medical unit.

The recommended tests are:

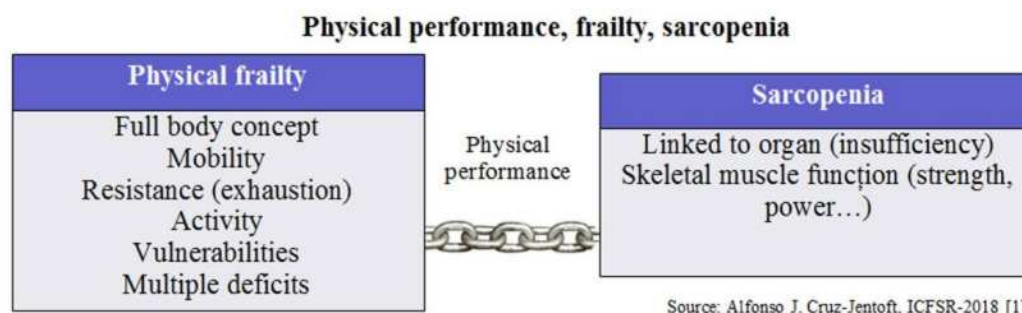
- Clinical Frailty Scale (CFS);
- Edmonton Frail Scale (EFS);
- FRAIL Index;
- Prisma-7;
- Short Physical Performance Battery (SPPB);
- Study of Osteoporotic Fractures Index (SOF) and two postal questionnaires
- Inter-Frail and Sherbrooke.

These tests are added to walking speed, proven to be a good predictor of frailty [5]. In 2018, WHO has tasked an expert group to create measurement tools for intrinsic capacity in the clinic. "It will be necessary

for these instruments to be universal and comprehensive and they must address more health issues in different countries" [6].

Sarcopenia is a key component of physical frailty. The concept of the motor unit was defined by Liddell and Sherrington from 1925 and consists of the motor-neuron and all the muscle fibers innervated by that motor neuron [8]. Essentially, if a motor-neuron is lost, a motor unit is lost. The consensus view from both animal and human studies is that motor units are lost with age [9]. Doherty et al. demonstrated a 50% shrinking in motor neurons in the 6th decade of life [10]. Only in October 2016 the WHO recognized sarcopenia as a disease in its own right, until then being only a syndrome associated with geriatrics. In Europe of 2016, the estimated maximum number of people affected by sarcopenia was close to 20 million; and recent studies indicated that there will be more than 30 million seniors with this diagnostic by 2045 [11].

Several experts suggested developing a joint initiative focussed on frailty and sarcopenia, to increase awareness among a broader public and to facilitate identification and treatment for both of them. Although it is clear that the two health states have common characteristics, studies have reported a limited number of overlapping characteristics of the two. But they share a core condition: impaired physical performance (see Fig. 1) [1].



Source: Alfonso J. Cruz-Jentoft, ICFSR-2018 [1]

Fig. 1 Physical performance, frailty and sarcopenia

Clinicians prefer to diagnose frailty solely based on physical performance because these tests are easier to evaluate using objective criteria.

The most used tools for objective physical performance evaluation are:

(a) • Walking speed, • SPPB and • Walking distance of 400 m - have the highest reliability,
 (b) • Speed of walking and • SPPB - provides the most real prognosis,
 (c) • Walking speed - is the easiest to apply.
 Dr. Jack Guralnik and colleagues developed in 1994, at the National Institutes on Aging, a test battery, the Short Physical Performance Battery (SPPB), with data from a large population-based epidemiologic study [12]. The SPPB has had widespread use in observational studies, randomized controlled trials, and clinical settings across the globe in North and South America, Europe and Asia. The test captures limitations in lower extremity functioning that relate to gait, balance and strength. It is useful in assessing the elderly mobility and has some benefits in elderly evaluation:

- it is fast, efficient, accurate and it can be used both in research and clinics (it is practical and safe for people involved in administering it at the subjects' homes);
- it is reproducible and more sensitive to change;
- the assessment is close to reality for the prognosis on: the fall risk, the use of health care utilization, institutionalization and mortality.

Studies have also shown the SPPB to be accurate in measuring mobility limitations for patients with chronic obstructive pulmonary disease (COPD) and in older adults with multiple sclerosis [13].

There are studies that show links between physical exercises and maintaining the cerebral volume and also reducing the cognitive decline, after a sustained exercises program [14]. Other longitudinal studies revealed the association between

physic frailty and cognitive decline. These are the reasons for which IANA-IAGG Conference (Toulouse 2013) has defined a new clinical entity, the cognitive frailty.

OBJECTIVES

The work studies the interrelationships between physical performance assessed by SPPB with objective health (chronic pathology) and aspects of global functionality: physical (ADL), sensory, psycho-cognitive and social. It is desirable to test the SPPB's ability to screen for frailty.

MATERIAL AND METHODS

The lot consists of 182 INGG patients aged 45-88 years (mean age 68.5 years), 60 men and 122 women.

SPPB test battery objectively evaluates physical performance including: three balance positions (simple orthostatism, semitandem and tandem), assessing walking speed and sit-to stand performance.

Other tests are for:

- self-evaluation of physical functionality (ADL);
- affective functionality, depression (GDS-15);
- cognitive functionality (MMSE);
- sensory functionality: fatigue
 - Brief Fatigue Inventory (BFI) [15]
 - visual and - auditory acuity and
 - pain (VAS).

RESULTS AND DISCUSSIONS

The share of frailty assessed by SPPB is 25.3% and that of pre-frailty is 40.1% (Fig. 2).

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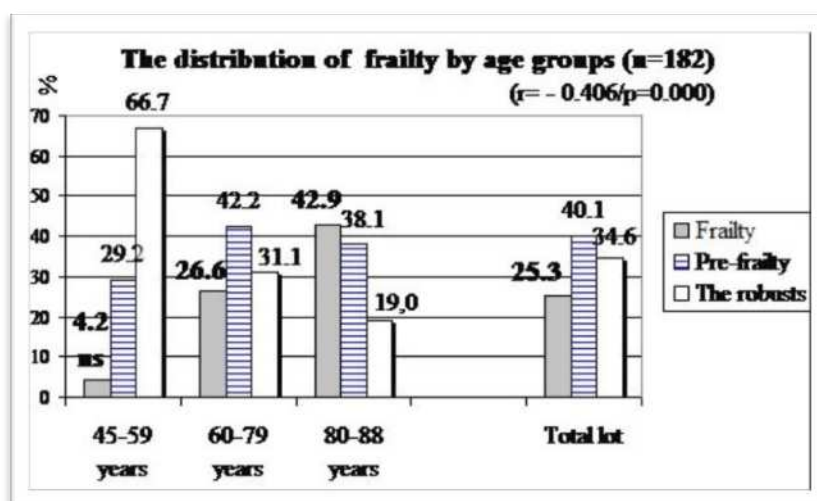


Fig. 2 The distribution of frailty by age groups

We analyzed the Rockwood criteria of construct validity for a successful definition of frailty [16]. SPPB, used to assess frailty, verifies the direct relationship of fragility with age, polymor-

bidity and disability (Fig. 2-4). But the frailty thus measured did not correlate with gender. The explanation could be the numerical difference, women being twice as numerous as men.

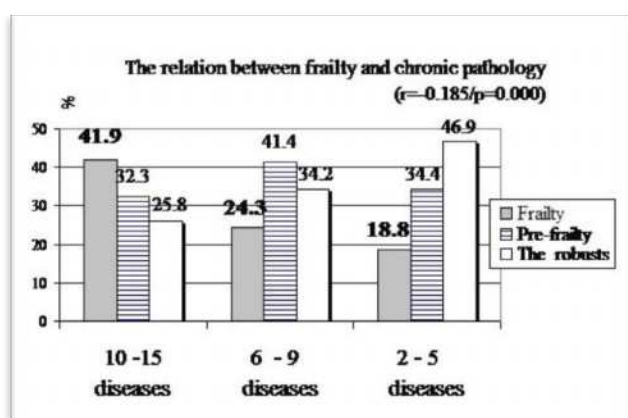


Fig.3 The relation between frailty and chronic pathology

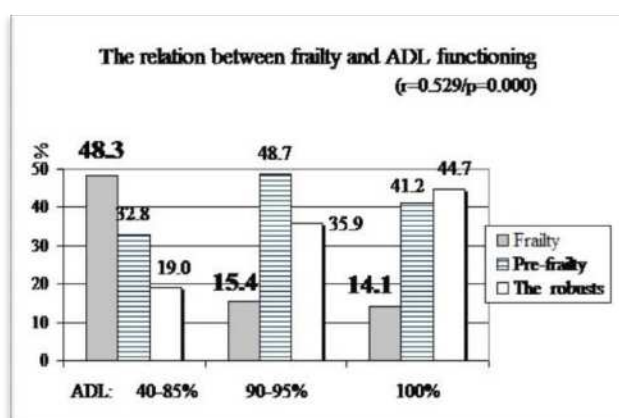


Fig.4 The relation between frailty and ADL functionality

Fig. 5 illustrates the prevalence of chronic pathologies from the lot compared between genders. Large differences, with higher weights for women, occur in the case of

osteoarticular, cardiovascular and endocrine-metabolic diseases. For the other pathologies, men have slightly higher prevalence than women.

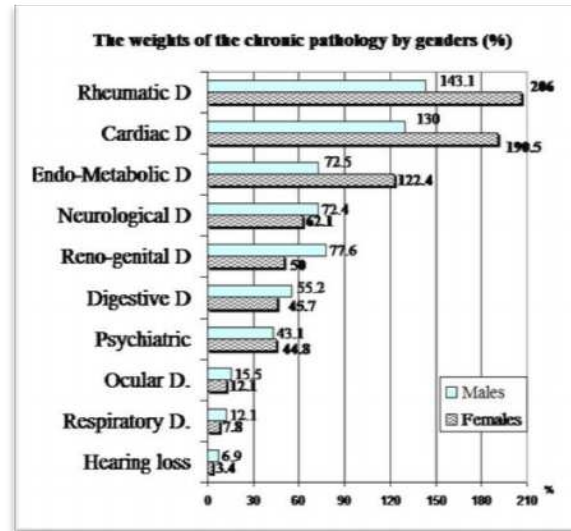


Fig. 5 The prevalence of the chronic pathology distributed by genders (%)

Several frailty indicators are used to assess intrinsic capacity. But in different geographic areas, additional assessments are needed to be added for evaluations. For example, “in Europe, where dementia occurs more frequently, evaluations of cognitive impairment are necessary; in Africa, hearing and vision tests are needed, since deafness and blindness are major causes of disability“ [6].

In this work, using SPPB, a physical performance test, we study the degree to which frailty influences the systems which

performs motor activities. Depression and cognitive disorders strongly correlate with frailty (SPPB), as shown in Tab. I, the situation mentioned for the European countries. We can see the relationships: frailty - GDS ($r=0.468/p=0.000$) and frailty-MMSE ($r=0.342/p=0.000$). But also sensory, visual and hearing disorders correlate significantly with frailty, a feature specific to underdeveloped African countries.

Tab. I Correlations between frailty (SPPB) and chronic pathology linked to psycho-neurological capabilities

SPPB Index correlated with:	r =	p =
Depression(GDS)	-0.468	0.000
Cognitive disorders (MMSE)	-0.342	0.000
Visual disorders score	-0.306	0.000
Hearing disorders score	-0.289	0.000
Neurological diseases	-0.173	0.020
Psychiatric diseases	-0.168	0.024

Kaplan et al. [17] argue that frailty may arise from one or more inadequate types of physiological capabilities included in four groups of organs:

- Resistance capacity that supports body activity and depends on cardiopulmonary activity and the ability of the muscles to metabolize O₂ during contractions.
- Musculoskeletal system capacity which assume mobility, muscle strength, bone strength.

- Psycho-neurological capabilities: environmental assessment and integration of information received through sensors (visual, vestibules and peripherals).

- Nutritional capabilities.

In the Tab. I, ordering the correlations after their intensities, we can see that on the first places, the psycho-affective impairments and sensory troubles are those that determine the frailty. They are included in the group of psycho-neurological capabilities (after Kaplan et al.). In other words,

the health state depends first on the assessment of the extrinsic capacity (the environment) by sensors (visual, auditory and proprioceptive) and subsequently by the integration into the central nervous system of the obtained data. The resistance capacity that supports body activity and also, the musculoskeletal system capacity are situated on the second place, according to the intensity of correlations from the Tab. II. The significant correlations of the

frailty with pathology linked to resistance capacity are the following: with circulatory function, $r=-0.296/p=0.000$ and with the resistance (at fatigue), $r=-0.187/p=0.012$. Significant links between SPPB and the osteoarticular system functioning, only for women is $r=-0.230/p=0.011$, and SPPB-the intensity of chronic pain, closely related to locomotor system functioning, only for men, is $r=-0.297/p=0.021$.

Tab. II Correlations between frailty (SPPB) and chronic pathology linked to resistance and musculoskeletal capacities

SPPB Index correlated with:	r =	p =
Number of cardiovascular diseases	-0.296	0.000
Fatigue usually felt (BFI item)	-0.187	0.012
Pain assessment (VAS) (only in men group)	-0.297	0.021
Arthrosis with various localizations (women group)	-0.175	0.050
Heart failure	-0.173	0.020
Ischemic heart disease	-0.157	0.035
Hypertension	-0.146	0.050

Tab. III shows significant correlations of the frailty with the last group named by Kaplan in his theory of influencing the

physiological capacities by frailty: the nutritional capacities.

Tab. III Correlations between frailty (SPPB) and chronic pathology linked to nutritional capacities

SPPB Index correlated with:	r =	p =
Gastric and duodenal ulcers, gastroduodenitis	0.207	0.005
Mixed dyslipidemia	0.183	0.014
Thyroid diseases	0.175	0.019
Number of digestive diseases	0.160	0.032

From the definition of functional ability we know that all physical and mental abilities included in intrinsic capacity permanently interact with the physical and social environment (extrinsic capacity). The Tab. IV, shows that physical performance (SPPB) is significantly linked to the social

environment of the subjects: when they are satisfied with social relations and social support and they show greater interest in everyday life, their physical performance may be better and they are less vulnerable and healthier.

Tab. IV Correlations between frailty (SPPB) and social aspects

SPPB Index correlated with:	r =	p =
Age	-0.406	0.000
Satisfaction with social relationships	-0.350	0.000
The evaluation of social relations(numerical)	-0.328	0.000
Interest in everyday life	-0.288	0.000

By analysing our study data, we have seen the high correlations between affective and cognitive functionality and social relations with frailty (a state of health). In this context, we recall the concept of resilience, recently introduced in the concept-

tualization of the state of health: "Health is the resilience or ability to cope, to maintain and restore integrity, balance, and well-being in three areas: physical, mental and social". "And the frailty is the weakness of health status thus defined" [18].

CONCLUSIONS

Early detection of mobility limitations represents an important goal for preventing the frailty and finally, the disability. From the literature, we know that SPPB is a relatively fast, efficient, reproducible, and flexible test battery. It can be used both in the clinic and in the community, at the home of the subjects. From our correlation analysis, we see it as a sensitive test for the physical condition of the subjects, linked to the age and pathology (cardiac, osteo-articular, nutritional), but before them, to their psycho-social condition. The test brings extra elements by additionally

assessing the balance, not only the movement with or without displacement. Namely, it evaluates the sensory functionality linked to proprioceptive, auditory, visual analyzers and subsequently how their information is integrated into the central nervous system. This could be the reason for which the test correlates primarily with the depression and cognition of the subjects and secondarily with the resistance and musculoskeletal capacities. So, we can conclude that SPPB represents a complex test that efficiently assesses the global health state in both its physical and psycho-social dimensions.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Cruz-Jentoft A. *Recommendations for the standardization of the assessment of physical performance*. Hospital Universitario Ramón y Cajal (IRYCIS). ICFSR 2018, Miami, Florida, USA. Retrieved from: <http://www.aging-news.net/recommendations-for-the-standardization-of-the-assessment-of-physical-performance/>
- [2] WHO. *Global strategy and action plan on ageing and health*. 2017. Retrieved from: <http://www.who.int/ageing/WHO-GSAP-2017.pdf?ua=1>
- [3] Brody J. *Physiologic reserve greatly affects the body's ability to function*. 2010. Retrieved from: <http://www.ocala.com/news/20101109/physiologic-reserve-greatly-affects-the-bodys-ability-to-function>.
- [4] Chegg Study. *Measuring the Physiological Reserve*. Retrieved from: <http://www.chegg.com/homework-help/definitions/measuring-the-physiological-reserve-14>
- [5] Bozdog E, Pîrlog R. *Managementul pacientului varstnic fragil*. Viata medicala, 2018, 11, 1468.
- [6] Araujo de Carvalho I. *Senior Policy and Strategy Adviser in WHO's Department of Ageing and Life Course*. ICFSR 2018, Miami, Florida, USA,. Retrieved from: <http://www.aging-news.net/update-on-whos-healthy-ageing-framework/>
- [7] Rodríguez-Laso A, Caballero Mora M et al. *State of the art report on the prevention and management of frailty*. 2017. Retrieved from: <http://www.advantageja.eu/index.php/news-titulo/news/288-the-advantage-ja-state-of-the-art-report-is-online>
- [8] Liddell EGT, Sherrington CS. *Recruitment and some other factors of reflex inhibition*. Proc R Soc Lond Ser B, 1925, 97, 488-518.
- [9] Nikolic M, Bajek S et al. *Muscle loss in aging population*. Periodicum Biologorum, 2013, 115, 4, 505–509.
- [10] Doherty TJ, Vandervoort AA, et al. *Effects of motor unit losses on strength in older men and women*. J Appl Physiol (1985). 1993 Feb;74(2):868-74.
- [11] Mijnders D. *Sarcopenia: A Rising Geriatric Giant- Health and Economic Outcomes of Community Dwelling Older Adults with Sarcopenia*. Dissertation for the degree of Doctor, ISBN: 978-94-028-0084-5, Maastricht 2016.
- [12] Guralnik JM, Simonsick EM, Ferrucci L et al. *A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission*. J Gerontol, 1994, 49(2), M85-94.
- [13] Treacy D and Hassetta L. *The Short Physical Performance Battery*. Journal of Physiotherapy, 2018, 64, 61.
- [14] Erickson K, et al. *Physical activity, brain, and cognition*. Current Opinion in Behavioral Sciences, 2015, 4, 27-32.
- [15] Mendoza T, Wang XS, Cleeland CS, et al. *The rapid assessment of fatigue severity in cancer patients: use of the Brief Fatigue Inventory*. Cancer, 1999, 85: 1186-1196.
- [16] Rockwood K. *What would make a definition of frailty successful?* Age and Ageing, 2005; 34, 432–434.
- [17] Kaplan GA. *Behavioral, social, and socio-environmental factors adding years to life and life to years*. 1997. In: Hickey T, Speers MA, Prohaska TR, editors. Public health and aging. Baltimore (Md): Johns Hopkin University Press.
- [18] Boers M, Cruz-Jentoft AJ. *New Concept of Health Can Improve the Definition of Frailty*. 2015, 97(5), 429-31.

SPECIFIC PATTERNS FOLLOWING INTERMITTENT LIGHT STIMULATION OF A PATIENT WITH ANXIETY

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Abstract. This paper discusses particular aspects regarding electrical brain activity driven by Intermittent Lighting Stimulation (ILS), a routine activation method, through which the patient's visual field is exposed to short term light stimuli with a certain frequency through a stroboscope. The stimulation frequency was between 3-15 flashes/second, for 10 seconds, in series of 3, 6, 9, 12, 15 stimuli. The light source was placed 30 cm away for the subject. The stimulation was carried both with open and closed eyes. The results obtained after the standard computerized electroencephalogram (EEG) and the one with activations were corroborated with the psychological, neurological and geriatric tests. Based on these clinical and paraclinical examinations, run at “Ana Aslan” National Institute of Geriatrics and Gerontology, patients are recommended the following: neurofeedback therapy and psychological therapy, with a reevaluation after 6-12 months.

Key words: SLI, EEG, Neurofeedback

PARTICULARITĂȚI REZULTATE ÎN URMA STIMULĂRII LUMINOASE INTERMITENTE LA UN PACIENT CU ANXIETATE

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Rezumat. În această lucrare sunt prezentate aspect particulare legate de activitatea electrică cerebrală provocată prin Stimularea Luminoasă Intermitentă (SLI), metodă de activare de rutină prin care câmpul vizual al pacientului este supus unor stimuli luminoși de scurtă durată, cu o anumită frecvență prin intermediul unei lămpi de tip stroboscop. Frecvența de stimulare a fost între 3-15 flash-uri/secundă, cu durata de 10 secunde, în serii de 3, 6, 9, 12, 15 de stimuli. Sursa de emisie a fost plasată la 30 de cm distanță față de subiect. Stimularea se face cu ochii închiși și deschiși. Rezultatele obținute în urma investigației de tip electroencefalogramă (EEG) computerizată standard și EEG cu activări, au fost coroborate integrativ cu examinarea psihologică, neurologică și geriatrică. Tabloul sintetic al simptomatologiei și al examenelor clinice, paraclinice efectuate în cadrul Institutului Național de Geriatrie și Gerontologie “Ana Aslan”, determină ca opțiuni: terapia de tip neurofeedback și psihoterapia, urmând reevaluarea la 6-12 luni.

Cuvinte cheie: SLI, EEG, Neurofeedback

INTRODUCTION

This paper presents the case of a female patient with anxiety that was tested using computerized electroencephalogram (EEG)

investigations. This included eye-open (EO) and eye-closed activations, hyperventilation and intermittent lighting stimulation (ILS). The investigation was done at “Ana

Aslan” National Institute of Geriatrics and Gerontology’s (INGG) Laboratory of Functional Explorations between the 14th and 25th of May 2018.

Clinical Case

The patient, aged 55, came to INGG after multiple consultations that didn’t offer a satisfactory diagnosis. While admitted at INGG, multiple medical tests were conducted, including biochemical, hematological, immunological, neurological, geriatric, cardiological and psychological tests as well as EKG, Pulsoximetry, MRI, DEXA and pulmonary radiography. All results were normal.

Likewise, the patient had an EEG to measure the brain’s electrical potentials [1]. When the neurons are active, they produce electrical impulses that can be measured using scalp electrodes that help recording the brain’s activity and creating what we know as the electroencephalogram [2, 3]. This investigation was undertaken because of its potential to add a neurological diagnosis in neurosurgery and psychiatry as well as determining the length of the corneas or in intensive therapy, endocrinology, geriatrics or neurophysiology [4]. As the patient had psychological symptoms (e.g. anxiety, panic attacks, mild depression, ipohondria, fear of perse-

Transversal – anterior

FP₁ – FP₂

T₃ – C₃

C₃ – C₄

C₄ – T₄

Longitudinal – Left

Fp₁ – C₃

C₃ – P₃

P₃ – O₁

T₃ – T₅

cution), the computerized EEG seemed to be the logical step, under the patient’s agreement to be tested. She was also told from the beginning about the invasive nature of this investigation that doesn’t have any secondary effects. Based on the working protocol, 24h before the investigation, the patient was also prepared by washing her hair, removing all make-up, not drinking any coffee and not taking any sedative medication.

Working method

Within the INGG Functional Explorations Laboratory, we used cup-shaped silver electrodes applied directly on the patient’s scalp according to international standards and to Jasper’s (1941) scheme, based on anatomical marks as recommended by the latest Guide of the American EEG Society. After degreasing the scalp using medical alcohol, the electrodes were placed bilaterally on the Frontal (F), Central (C), Parietal (P), Occipital (O), Anterior Temporal (TA) and Posterior Temporal (TP) zones. Furthermore, we used bipolar (transversal and longitudinal) recording programs. These can be visualized in the diagnosis structure.

Transversal – posterior

T₅ – P₃

P₃ – P₄

P₄ – T₆

O₁ – O₂

Longitudinal – Right

Fp₂ – C₄

C₄ – P₄

P₄ – O₂

T₄ – T₆

After the patient relaxed, closed her eyes and started having positive thoughts, the EEG recording started. The structure of the spontaneous recording (see Fig. 1 and Fig. 2) has significant artifacts as the patient moves, talks, can’t relax and blinks despite being told not to beforehand. Despite that

in the first 3 minutes she felt sick (sweating, fainting sensation), the examination of her physiological parameters revealed that there were no changes that could determine the described symptoms. Nevertheless, the investigation was stopped.

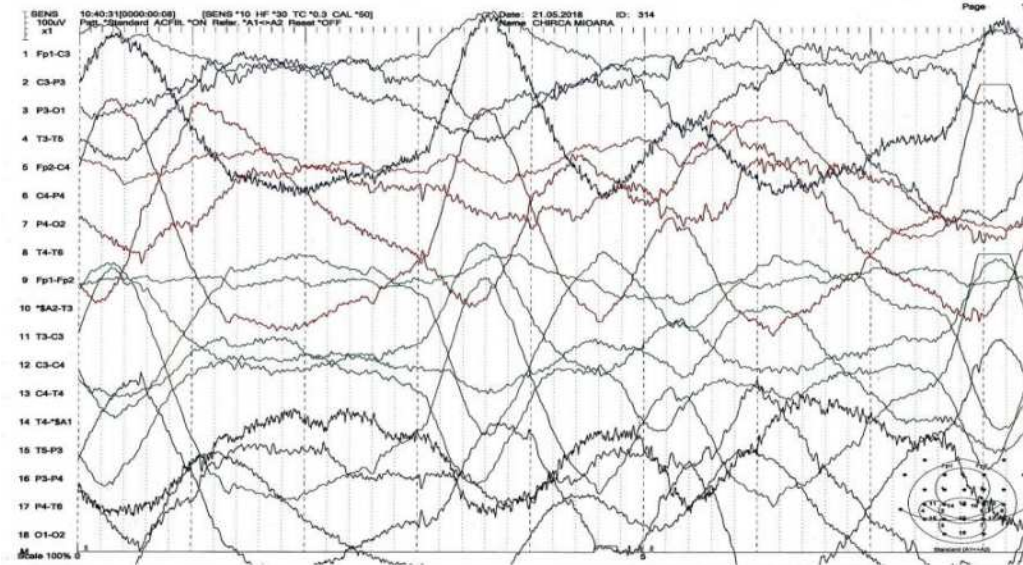


Fig. 1 First EEG Recording - 21st of May 2018

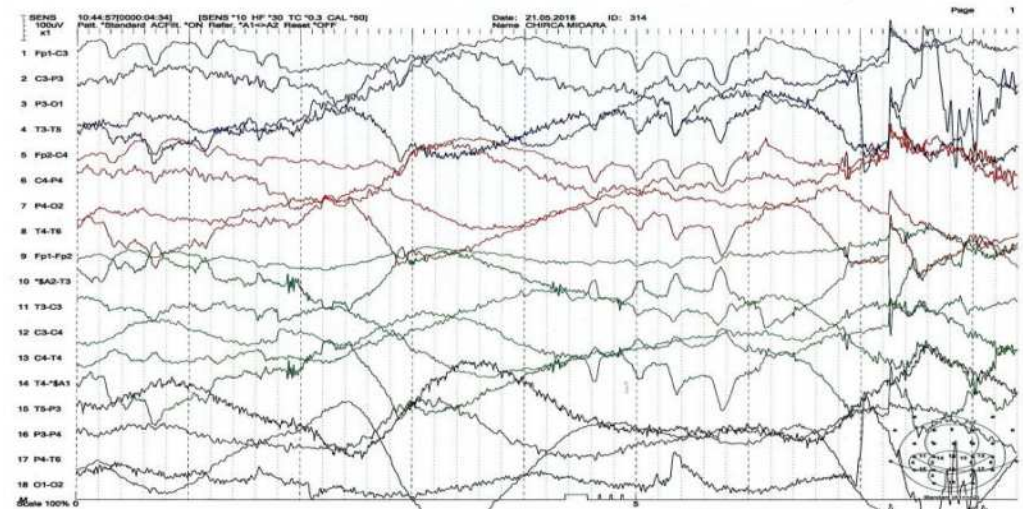


Fig. 2 The structure of the spontaneous recording has significant artifacts

After two days, at the second recording, the recording structure shows neither inter-hemispheric asymmetry, nor irritative elements (see Fig. 3). The amplitude is defined by acute hypovoltage and some discrete medium voltage. The frequency is 12-15-20 Hz/s, while the alpha rhythm is almost non-existent. Moreover, the beta rhythm is diffusely spread, while the theta and delta ones are completely absent.

Routine activations

1. **Eye-open/Eye-closing:** maintain the structure of the recording within the limits described previously.
2. **Hyperventilation (3 min):** does not change the recording's structure. The normal response would have been the subject's relaxation, the structural amplification and the decrease of quick beta elements and their replacement with the alpha rhythm. The alpha rhythm is in standby and relaxation mode with opened eyes and it dominates the recording, being mostly present in the posterior derivation.

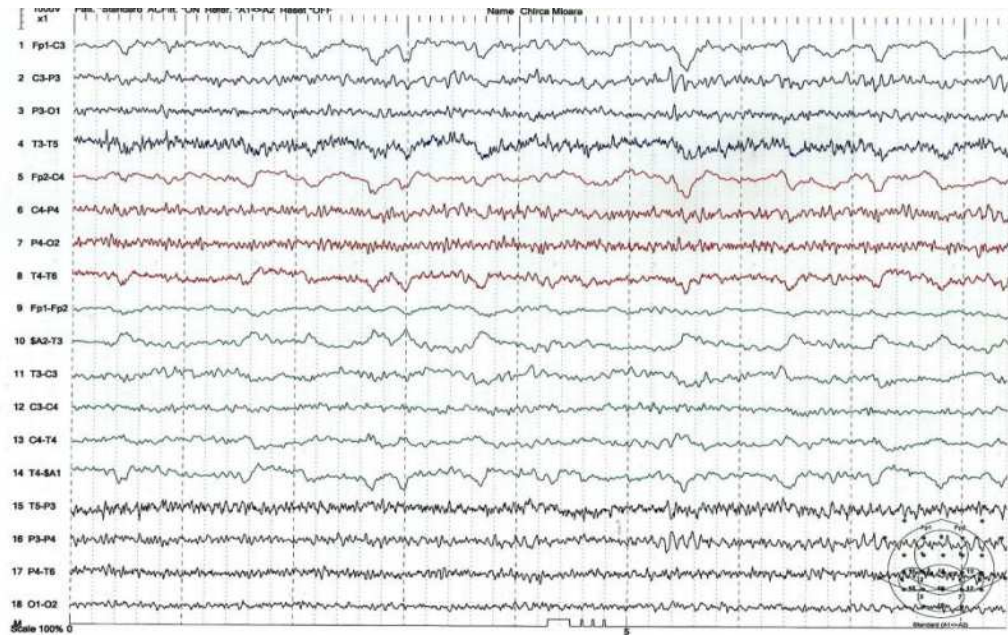


Fig.3 The EEG recording structure in standby mode, after the two types of activations is hyper-reactive

3. Intermittent Light Stimulation (3, 6, 9, 12, 15f/s). The patient's visual field is stimulated by short-term lighting stimuli emitted with various frequencies by a stroboscopic lamp [5]. The light source is placed 30cm away from the subject and the frequency is between 1-30 flashes/s. Through ILS we can study the critical frequency of light fusion, the photomyo-

clinic response, the photoconvulsive answer and the PE study [1].

Regardless of the stimulation frequency, when the patient receives the ILS, the recording changes significantly from beta rhythms suddenly to monomorph alpha rhythms with 8-10 Hz/s frequency (see Fig. 4 and Fig 5). The reverse process happens as soon as the ILS is stopped.

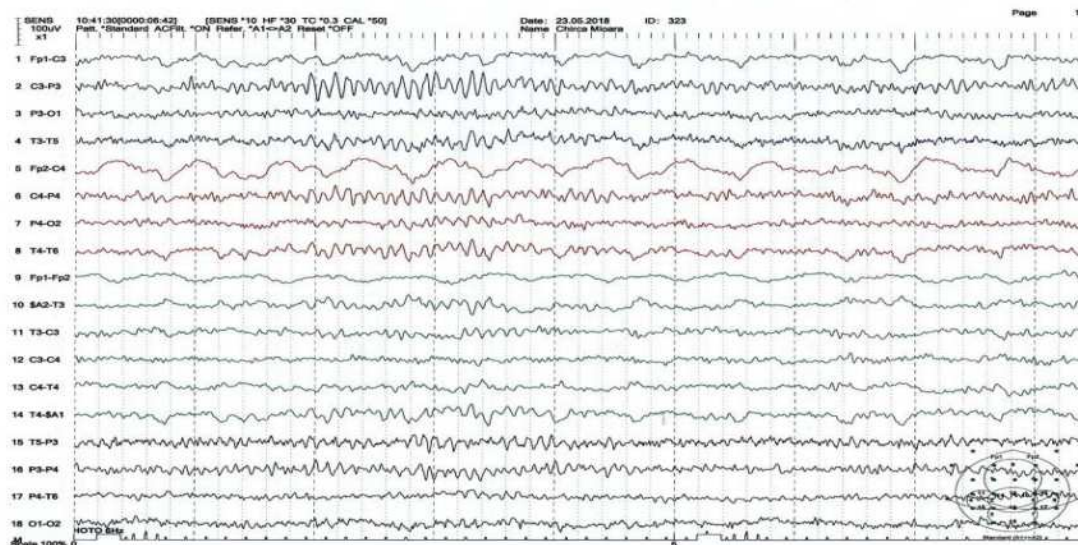


Fig. 4 EEG Recording during ILS

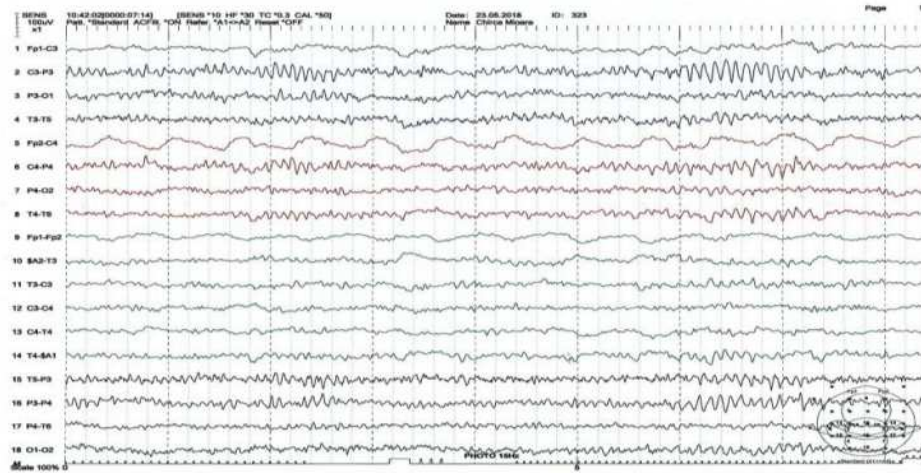


Fig. 5 EEG Recording during ILS

ILS was repeated (Fig. 6).

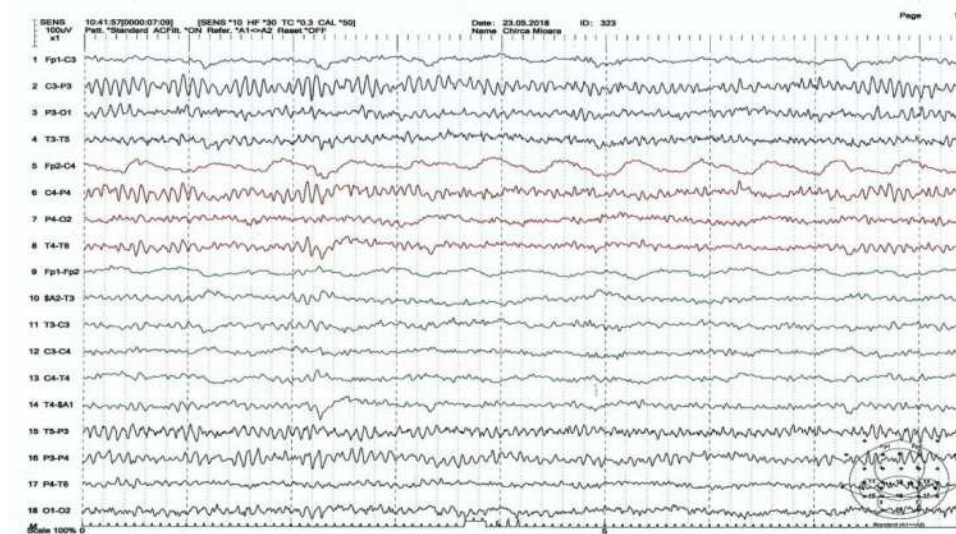


Fig. 6 The recording changes significantly from beta rhythms suddenly to monomorph alpha rhythms with 8-10 Hz/s frequency

After ILS activations, the recording's structure goes back to quick frequencies and lower amplitude (Fig. 7).

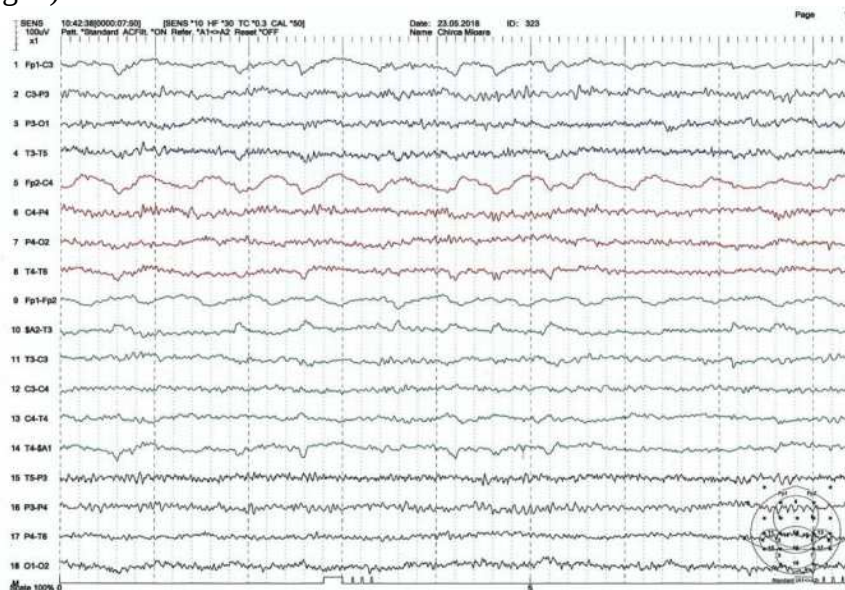


Fig.7 After ILS activations, the recording's structure goes back to quick frequencies and lower amplitude

Patient's reactions beginning with the first EEG try but also after detailed conversations with the patient from which we can see that the patient presents anxiety elements, sometimes even reaching the levels of panic attacks, strongly recommended the need of a psychological exam.

PSYCHOLOGICAL EXAM

The psychological exam entails the following steps: identification details, main symptoms, application of tests.

Identification details

C. M., woman, 55 years old, lives with her daughter, graduated from Law School, clerk of the court. Married second time. Has a cold relationship with her husband, feeling that is hard to talk to him, having no common interest. The rupture between them began 7 years ago. They live together from time to time. Approximately a year ago she had a surgical intervention. Starting from a uterine fibroid she had a total hysterectomy, causing forced menopause at 54 years old.

Main symptoms

Arthritis - "I have trouble walking and I have back pain", "since approximately a month ago I have trouble remembering" - **attention deficit**. During forced menopause, she feels that "she doesn't love herself as much as she should".

The history of the present problem

She has been experiencing serious insomnia for 3 years, insomnia when going to sleep and when sleeping, feeling somewhat tired in the morning. She finds it hard to focus on one activity because she gets tired quickly. Even though she likes her job, she feels overworked and overwhelmed. "It is very important to focus and to be on top of what I have to do because people depend on what I type. I can't afford to make any mistakes". Her relationship with her daughter is a good one. Her relationship with her husband is tense, they are living in separate houses and they meet occasionally. They keep in

touch mostly by telephone. This type of relationship induces a mood of uncertainty and an always emergency state. "It would have been easy for me to file the divorce paper because I am working in a tribunal but I rather leave him do this step. He is a vengeful man. I do not feel married to him but I also do not feel free enough to go into another relationship. I am in this situation for 7 years now". During the interview, it has been observed that the patient: has a fear of being ill, she imagines that she will have various serious illnesses, she went to see different specialists without being given a diagnostic to confirm her fears, but this did not happen, she feels alone and helpless.

According to the GDS 15 test, the patient feels unhappy about her life at the moment, she lost interest in various activities and she even gave up on some (because she doesn't feel good/energetic, she doesn't have time or they do not bring her satisfaction), she feels that her life is empty and she is struggling to find a meaning. Her health maintenance efforts, not confirmed by the reached diagnosis, take up a lot of her time and she feels helpless because "I do not have any support".

According to BDI-II - she feels sad most of the time, her ability to be happy has diminished (she tends to think that she is happy rather than actually feeling it), her self esteem has lowered feeling that she lost her confidence, she cries more than usual, she is more nervous and tense than her usual self. Being so indecisive, she has a hard time choosing and deciding, she feels that her energy levels are lower than usual, she doesn't get enough or restful sleep at night, she feels more irritable and agitated than usual, her ability to focus decreased and tiredness comes quicker, she has moments when she is too tired to do something.

Applied tests:

a.-GDS: 5/15 present mild depression elements

b.-BDI-II the score indicates mild depression

c.-Clock Test: 10 /10

d.-MMSE1 please refer to geriatric FOGC: 30p/30

e.-MMSE2: when undertaking similar tests, from the first part, identical to MMSE1, patient scored the same. Version MMSE2, under the second part there is a story which the patient has to retell from memory after the text is being read to her only once, and a speed test in which she has to associate some signs with the corresponding number from 1 to 9. Her final result is 45 points. According to her level of studies and age, this score is low. A common score would mean a minimum of 51.97 points..

f.-Flanker Ac. Her working rhythm is very alert joined by a series of errors which determine a moderate precision level. Patient presents attention deficit and impulsiveness.

DISCUSSION

Given the patient's anxiety and the way she reacted to ILS, the neurofeedback therapy can represent a solution for treatment. A significant number of recent studies have shown that this type of therapy is effective for depression, anxiety or lack of attention [3, 5-15]. The Neurofeedback therapy is known as an ongoing intervention, tailored to individual needs, not needing any medicines, being primarily based on psycho-physiology [7, 16]. There are no significant side-effects either [17, 18]. Similarly, it does not use any electric or magnetic fields [19, 20]. The therapy is based on the individual's active perception, which progressively

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Phneah SW, Nisar H. *EEG-based alpha neurofeedback training for mood enhancement*. Australas Phys Eng Sci Med 2017, 40(2):325-336.
- [2] Jackson AF, Bolger DJ. *The neurophysiological bases of EEG and EEG measurement: a review for the rest of us*. Psychophysiology 2014, 51(11):1061-71.

learns how to modulate their own brain activity, under strict specialist guidance [6, 21]. It is based on measuring the electrical brain activity which makes it an observation process that's passive and non-invasive [12, 19].

In this respect, the neurofeedback therapy can be used in two distinct ways. First, it can help stabilizing the brain's physiology which is usually applied to subjects with weak reactions to destabilizing factor [14]. As a result, the brain becomes more stable as well as more flexible. Second, it can help solving profound subconscious psychological problems. This is known as the Alpha-Theta Training and it is recommended after a few sessions of physiological stabilization. It is used for patients with emotional trauma [22]. This is why anyone can benefit from Alpha-Theta training to discharge the emotional weight [11].

CONCLUSION

The patient presents mild to moderate attention deficit, long term memory loss, low impulsiveness, good processing speed, and low to moderate ability to focus which decreases on the long term. She also has a slight anhedonia, loneliness feeling, hyperprosexty in sector (due to her relationship with her husband), slight depression with anxiety elements. Both the EEG recording and the psychological tests have shown that the patient has anxiety. The full clinical picture given by the medical examinations, symptomatology and the psychological tests emphasize psychotherapy and neurofeedback therapy as therapeutic options.

- [3] Markiewicz R. *The use of EEG Biofeedback/Neurofeedback in psychiatric rehabilitation*. Psychiatr Pol 2017, 51(6):1095-1106.
- [4] Constantin D, Craiu D, Butoianu N, Popescu CD, Sîrbu CA, Lupescu T. *Electroencefalograma clasică și modernă la adult și copil*. 2008, ed. II, pg. 9.
- [5] Gruzelier JH. *EEG-neurofeedback for optimising performance. I: a review of cognitive and affective outcome in healthy*. Neurosci Biobehav Rev 2014, 44:124-41.
- [6] Hengameh Marzbani, Hamid Reza Marateb, Marjan Mansourian. *Neurofeedback: A Comprehensive Review on System Design, Methodology and Clinical Applications*. Basic Clin Neurosci 2016, 7(2):143-58.
- [7] Arns M, Batail JM, Bioulac S, et al. *Neurofeedback: One of today's techniques in psychiatry?* Encephale 2017, 43(2):135-145.
- [8] Gmaj B, Januszko P, Kamiński J, et al. *EEG source activity during processing of neutral stimuli in subjects with anxiety disorders*. Acta Neurobiol Exp (Wars) 2016, 76(1):75-85.
- [9] Locke AB, Kirst N, Shultz CG. *Diagnosis and management of generalized anxiety disorder and panic disorder in adults*. Am Fam Physician 2015, 91(9):617-624.
- [10] Tose K, Yoshihara Y, Takahashi H. *fMRI Neurofeedback and its Application to Psychiatric Disorders*. Brain Nerve 2018, 70(11):1209-1216.
- [11] Lavy Y, Dwolatzky T, Kaplan Z, Guez J, Todder D. *Neurofeedback Improves Memory and Peak Alpha Frequency in Individuals with Mild Cognitive Impairment*. Appl Psychophysiol Biofeedback 2018, Oct 4. doi: 10.1007
- [12] Sherman DS, Mauser J, Nuno M, Sherzai D. *The Efficacy of Cognitive Intervention in Mild Cognitive Impairment (MCI): a Meta-Analysis of Outcomes on Neuropsychological Measure*. Neuropsychol Rev 2017, 27(4):440-484.
- [13] Jeunet C, Glize B, McGonigal A, Batail JM, Micoulaud-Franchi JA. *Using EEG-based brain computer interface and neurofeedback targeting sensorimotor rhythms to improve motor skills: Theoretical background, applications and prospects*. Neurophysiol Clin 2018 Nov 7. pii: S0987-7053(18)30259-4
- [14] Mennella R, Patron E, Palomba D. *Frontal alpha asymmetry neurofeedback for the reduction of negative affect and anxiety*. Behav Res Ther 2017, 92:32-40.
- [15] Zich C, Debener S, Kranczioch C, Bleichner MG, Gutberlet I, De Vos M. *Real-time EEG feedback during simultaneous EEG-fMRI identifies the cortical signature of motor imagery*. Neuroimage 2015, 114:438-47.
- [16] Tibor Auer, Wan Ilma Dewiputri, Jens Frahm, Renate Schweizer. *High-order Brain Areas Associated with Real-time Functional MRI Neurofeedback Training of the Somato-motor Cortex*. Neuroscience 2018, 378:22-33.
- [17] Mohammad Nazer, Hanifeh Mirzaei, Mohammadreza Mokhtaree. *Effectiveness of neurofeedback training on verbal memory, visual memory and self-efficacy in students*. Electron Physician 2018, 10(9):7259-7265.
- [18] Srabani Banerjee and Charlene Argáez. *Neurofeedback and Biofeedback for Mood and Anxiety Disorders: A Review of Clinical Effectiveness and Guidelines*. Canadian Agency for Drugs and Technologies in Health 2017 Nov 13.
- [19] Giannakakis G, Grigoriadis D, Tsiknakis M. *Detection of stress/anxiety state from EEG features during video watching*. Conf Proc IEEE Eng Med Biol Soc 2015;2015:6034-7.
- [20] Ribas VR, Ribas RG, Nóbrega JA, et al. *Pattern of anxiety, insecurity, fear, panic and/or phobia observed by quantitative electroencephalography*. Dement Neuropsychol 2018, Jul-Sep; 12(3): 264–271.
- [21] Kadosh KC, Staunton G. *A systematic review of the psychological factors that influence neurofeedback learning outcomes*. Neuroimage 2018, Oct 10. pii: S1053-8119(18)31980-3.
- [22] Reis J, Portugal AM, Fernandes L, et al. *An Alpha and Theta Intensive and Short Neurofeedback Protocol for Healthy Aging Working-Memory Training*. Front Aging Neurosci 2016, Jul 7;8:157.

ASPECTS OF DEMENTIA CARE - BETWEEN FORGETTING AND BEING FORGOTTEN

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Abstract. Dementia has become a public health problem with epidemic proportions. European and national strategies were initiated and implemented, with specific tailored targets and action plans, due to improve the quality of life for people living with dementia. Romanian health public policy does not include dementia as a priority. There is a major gap between the healthcare and social needs for dementia sufferers and the actual services provision.

Key words: dementia, care, person-centered care

ASPECTE ALE ÎNGRIJIRII PACIENȚILOR CU DEMENTĂ - ÎNTRE A UITA ȘI A FI UITAT

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Rezumat. Demența a devenit o reală problemă de sănătate publică de proporții epidemice. La nivel european și a mai multor țări din Uniunea Europeană, au fost inițiate și implementate strategii cu obiective specifice și planuri de acțiune pentru creșterea calității vieții persoanelor cu demență. Politica națională de sănătate din România nu include demența ca prioritate. Există diferențe majore între nevoile de asistență medicală și socială ale persoanelor care suferă de demență și serviciile furnizate în mod real.

Cuvinte cheie: demență, îngrijire, îngrijire centrată pe persoană

INTRODUCTION

Dementia is a chronic progressive neurodegenerative condition characterized by deterioration of cognitive functions, including memory impairment and at least one of the following: aphasia, agnosia, apraxia, disturbances in executive functioning. Behavioral (apathy, agitation) and personality changes (disinhibition, paranoia) can occur and depression, anxiety, sleep disturbances, delusions and hallucinations may be associated. To date, there are over 100 known conditions that may cause dementia. The most frequent forms of dementia are Alzheimer's disease,

vascular and mixed dementia, dementia with Lewy bodies and frontotemporal dementia. The cognitive deficits lead to a significant decline in people's level of functioning causing social and occupational impairment. The symptoms may vary as to their intensity, association, time progression. Therefore, people living with dementia have different ways of experiencing their condition.

Dementia is, without doubt, a public health problem with epidemic proportions, especially in the context of global ageing. Worldwide, there is a new diagnostic of

dementia every 3.2 seconds equivalent to 9, 9 million new cases occurring annually [1]. In the World Alzheimer Report 2016, the estimates were that there are 46.8 million people worldwide living with dementia in 2015 (about 5% of world's elderly population) and this will increase to 131.5 million in 2050 [1].

Official data state that 58% of all people with dementia live in low- or middle-income countries, and this is estimated to increase to 63% in 2030 and 68% in 2050 [2]. Over 70% of new cases are expected to occur in these countries.

The same report established that people with dementia living in low- and middle-income countries, are diagnosed in less than 10% of cases. The situation is different in high income countries, where this proportion reaches 50% [1], but, nonetheless, sustains the fact that people with dementia generally have poor access to appropriate healthcare.

Dementia is a major cause of disability among elderly population, affecting patients and their families and careers and also societies and their economy through productivity loss and increasing health and social care costs.

Therefore, in 2017 “Global Plan of Action on the Public Health Response to Dementia 2017- 2025” was adopted by WHO (World Health Organization) during the 70th World Health Assembly. This action plan impels countries to develop national strategies to efficiently and practically manage dementia. By date, only 29 out of 194 the WHO Member States have developed a plan on dementia.

Action areas delineated in this plan refer to the following targets for the policy makers in order to improve the quality of life of people with dementia and their families and careers and to reduce the economic impact of the disease [3]:

1. "Dementia as a public health priority
2. Dementia awareness and friendliness
3. Dementia risk reduction
4. Dementia diagnosis, treatment, care and support

5. Support for dementia careers
6. Information systems for dementia
7. Dementia research and innovation".

THE PERSON-CENTERED APPROACH IN DEMENTIA CARE

The NICE guidelines on dementia promote a person-centered care as good practice standards in the management and support for people living with dementia and their careers. This approach does not equate simple individualized care or person-centered counselling. The principles delineate the individuality of dementia sufferers and how their personality, their life experiences, their interests and abilities influence their perspectives on tailoring the healthcare with their actual needs. People with dementia should be an active part when discussing their care and support after the diagnosis. The needs of their families and careers are important, as their understanding and views on the person's situation when developing a care plan [4]. Accurate understanding of a dementia sufferer experience and perspective on their condition is truly difficult, if not possible. People with dementia live on average for another eight years after being diagnosed, six of which usually in their homes, and the last two in a nursing care setting. During early stages, the person has often feelings that something has changed, is not right. He or she becomes forgetful, has difficulties managing time and locations, recognizing people, properly planning and executing their actions. Families and friends often do not recognize these slight but progressive changes until late in the course of the disease. Due to stigmatization and lack of understanding and awareness of the disease, families and communities more often condemn and alienate the dementia sufferer. He or she loses interest in activities and surroundings, does not comply with social demands and rules, refuses help, isolates in apathy or becomes irritable, has sleep problems, is often anxious or angry, has low mood. Managing familiar daily tasks becomes

more and more difficult which increases the burden on the caregivers. The dementia sufferer often has social inappropriate behavior which leads to further social withdrawal. Physical self-care becomes inadequate, the person is unable to properly wash, dress, becomes incontinent. Accidents due to forgetfulness might happen (fire, losses), often the person is found wandering and getting lost. Confusion, aggression, paranoia might further develop, bothering the family, caregiver, neighbors. The dementia sufferer often has other health problems which are worsened by the dementia due to lack of compliance with the medication, eating problems, falls. He or she has difficulties accepting the disease, more often has no access to relevant and practical information has no medical input. The caregiver has difficulties accepting the deterioration of their loved one, feels often angry or anxious, and if older, has his or her own health problems making the situation often unbearable. The caregiver often lacks support from family and friends, has to abandon social life, and often feels overwhelmed and unable to cope with the duty of care for the dementia sufferer. Usually, the person with dementia resists admission to hospital or nursing home. The caregiver and the sufferer more often have a negative opinion on residential nursing homes [3, 4].

THE ROMANIAN BACKGROUND

There are sparse official recent public data about the number of people diagnosed with dementia living in Romania. In 2012, the prevalence of dementia in Romania was estimated at 1.26% (approximately 270.000), lower than the European average of 1.55% [5].

There is a major discrepancy between the stringent need for prevention by addressing specific risk factors, early diagnosis, ensuring access to relevant information and adequate healthcare and social services, reducing stigma and the reality of the Romanian health system.

Dementia is not a priority for policy makers in the public health domain.

The major importance of the general practitioner (family doctor) in the management of dementia cases does need to be emphasized once more. The sad and real fact is that there are numerous locations in Romania where people have no access to medical primary assistance. This explains the high number of undiagnosed cases that reaches specialized medical assistance in late stages.

Stigma, lack of understanding and awareness of the disease often lead to late medical addressability. Dementia is underdiagnosed and diagnosis is made more often at a late stage in the course of the disease. People with dementia are not routinely involved in decision-making discussions and care plans. Health professionals more often do not have comprehensive information about the specific healthcare, social and palliative services available in their region. Interdisciplinary communication has substantial deficiencies and has no logistic support. Social support facilities for the people with dementia are not specifically tailored, inadequate, sparse and, more importantly, insufficient. They are often provided by civil associations with limited funds and with no or little and limited support from public health and social system. Clinical research is not stimulated. Healthcare services in inpatient settings are more often inadequate for dementia patients. There is a lack of trained healthcare professionals for the specific needs of these patients. There are only a few dementias tailored inpatient services nationwide, and these have usually their costs supported by the patients and their families. Public residential nursing homes are insufficient and not dementia tailored, as it is the case for private residential care homes, which are even less represented. Public settings usually have a long waiting list for admission, a lot of bureaucracy and the selection criteria for admission are often subjective. Day care centers exist in

very few locations, are usually supported by the church or private associations, and they are meant to serve people with social issues, not for dementia sufferers.

There are several palliative services provided by non-governmental organizations, but they are not designed for dementia sufferers only.

There are no occupational therapy services or home adaptation services for people with dementia.

Social assistance is represented only in hospitals and local services designed for people with disabilities and they are not meant for dementia sufferers only. Psychosocial assistance and counselling for persons living with dementia and their careers is limited, upon request and usually its costs are supported by the beneficiaries. Respite services at home or in private residential centers are rarely provided and

expensive. Support groups for people with dementia and their careers are absent in most of the cities.

CONCLUSIONS

Dementia care requires a profound and comprehensive analysis and a major change in the national health policies. Increasing quality of life of people living with dementia needs to be a priority for the public health policy makers. Exercising pressure from the professionals involved in the system towards identifying appropriate objectives and consequent measures and actions, may lead to practical and efficient strategies to change a system in failure. Aligning with international known structures and their management plans and learning from other European countries implemented measures and results may indeed prove useful.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Prince M, Comas-Herrera A, Knapp M. World Alzheimer Report 2016. *Improving healthcare for people living with dementia - coverage, quality and costs now and in the future*. Alzheimer's Disease International; 2016
- [2] Prince M, Wimo A, Guerchet M, Ali GC, Wu Yutzu, Prina M. World Alzheimer Report 2015. *The global impact of dementia: an analysis of prevalence, incidence, cost and trends*. London: Alzheimer's Disease International; 2015.
- [3] World Health Organization, 2017, "Global Plan of Action on the Public Health Response to Dementia 2017-2025" available at http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_28-en.pdf, accessed 22 April 2019
- [4] NICE guidance "Dementia: assessment, management and support for people living with dementia and their careers", published date: June 2018, available at: <https://www.nice.org.uk/guidance/ng97>, accessed 22 April 2019
- [5] Alzheimer Europe – Dementia in Europe Yearbook 2013 - with a focus on national policies relating to the care and support of people with dementia and their careers, as well as the prevalence of dementia including the Alzheimer Europe Annual Report 2012, available at <https://www.alzheimer-europe.org/Publications/Dementia-in-Europe-Yearbooks>, accessed 22 April 2019

POSSIBLE NEUROCOGNITIVE EFFECTS OF CHRONIC INFLAMMATION - A SHORT LITERATURE REVIEW OF AVAILABLE DATA

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Abstract. Physiological pathways linking the immune system and central nervous systems (CNS) are reviewed in this article and studies linking inflammation with neurocognitive function are overviewed from the literature. There are evidences suggesting that inflammation can be associated with age-related cognitive decline and may play a role in risk of dementia. Moreover, the conclusions of some recent studies are showing that inflammation in the 4th and 5th decade of life is linked to cognitive function underperformance and brain morphology alteration. Recent results of the studies that combined different markers of inflammation, neuroimaging methods and cognitive testes are consistent with the studies on animal model that showed that inflammation contributes to lower cognitive performance over and above more traditional cardiovascular risk factors (including education, arterial hypertension, metabolic factors, smoking, subclinical atherosclerosis and symptoms of cardiovascular peripheral inflammation) for cognitive aging disease. The studies reviewed here had some limitations including the fact that it was not estimated the impact of the multiple factors that are known to impact circulating levels of inflammatory mediators. Also, it seems that the evolution from mild cognitive impairment (MCI) to dementia may be linked with the chronic neuro-inflammation processes. The studies overviewed in this article suggest that circulating markers of inflammation may predict future cognitive decline risk and may contribute to the mechanisms of action in the preclinical neurocognitive decline.

Key words: normal ageing, neuro-inflammation, dementia, mild cognitive impairment

POSIBILE EFECTE NEUROCOGNITIVE ALE NEUROINFLAMAȚIEI CRONICE - O SCURTĂ PREZENTARE A DOVEZILOR DIN LITERATURĂ

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Rezumat. Căile fiziologice care leagă sistemul imun și sistemul nervos central (SNC) sunt revizuite în acest articol, iar studiile care leagă inflamația de funcția neurocognitivă sunt prezentate așa după cum le-am găsit în literatura de specialitate. Din ce în ce mai multe dovezi sugerează faptul că inflamația este asociată pozitiv cu declinul cognitiv legat de vârstă și poate juca un rol în creșterea riscului de demență. De asemenea, prezentăm concluziile unor studii recente care arată că inflamația în decadele 4 și 5 de viață este corelată pozitiv cu funcția cognitivă alterată dar și cu morfologia creierului. Rezultatele unor studii recente care combină markeri diferiți ai inflamației, metode neuro-imagistice și teste cognitive, sunt în concordanță cu studiile efectuate pe modelul animal și arată că inflamația contribuie la scăderea performanțelor cognitive mai mult decât factorii de risc tradiționali (cum ar fi factori de risc cardiovasculari, psiho-educația, hipertensiunea arterială, factorii metabolici, arterioscleroze sub-clinice și simptomele inflamației periferice cardiovasculare) pentru deficitul cognitiv. Studiile analizate au avut unele limitări, inclusiv faptul că nu au estimat impactului factorilor multipli care sunt

cunoscuți ca având impact asupra nivelurilor circulante ale mediatorilor inflamatori (cum ar fi: boala inflamatorie acută, stresul psihologic și activitatea fizică redusă). De asemenea, se pare că evoluția de la deficitul cognitiv ușor la demență poate fi legată de procesele cronice inflamatorii. Studiile prezentate în acest articol sugerează că markerii circulanți ai inflamației pot prezice într-o oarecare măsură riscul viitorului declin cognitiv și eventual, contribuie la fiziopatologia declinului neurocognitiv preclinic.

Cuvinte cheie: îmbătrânire normală, inflamație, demență, deficit cognitiv ușor

INTRODUCTION

When compared to younger individuals, the elderly adults perform significantly worse on tasks involving mental flexibility [1, 2], recognition [1] and delayed recall [3]. These declines typically begin in middle adulthood and progress at a consistent rate across the rest of life in addition to negatively impacting the quality of life of older adults, deteriorating cognitive function imposes significant risk for dementia, injuries, hospitalization and death [4, 5, 6]. The age-related cognitive decline is characterized by the gradual and progressive deterioration of several domains of cognitive ability, including executive function, working and episodic memory, processing speed and attention [4]. Accordingly, recent research has focused on the identification of factors that predict risk for age-related cognitive decline and may be targeted by preventative intervention and for example, it is known that traditional cardiovascular risk factors contribute to the prediction of risk for accelerated neurocognitive aging. In this regard, recent evidence suggests that systemic inflammation may also play a role [7, 8, 9], in opposition with the old paradigm, that the immune system and the brain functioned in isolation due to the anatomical separation of leukocytes from the central nervous system (CNS) by the blood-brain barrier (BBB).

The newest data challenges this paradigm and shows that peripheral inflammatory mediators exert an influence on brain function and play a critical role in the induction of sickness symptoms that accompany inflammatory disease. One of the best examples in humans is that the systemic infusion of IL-1 and/or interferon alpha, leads to: suppression of food intake; decreased social exploration; poorer

memory consolidation [10, 11,12]. Interestingly, the impairments in cognitive function have also been observed in animal models following the peripheral administration of lipopolysaccharide (an endotoxin that stimulates the release of proinflammatory cytokines) [13]. There were identified, at least three distinctive molecular pathways, that are linking peripheral immune stimuli to changes in the CNS. In the first case, the peripheral cytokines, that can stimulate brain vascular endothelial cells to release secondary messengers in the CNS that promote the central release of proinflammatory cytokines [14]. Another pathway is represented by the peripheral cytokines can activate vagal afferent nerves that stimulate the production of proinflammatory cytokines by central tissues [15], or/and peripheral cytokines can be actively transported in the paraventricular regions of the BBB [16]. These pathways provide a link between the peripheral expression of proinflammatory cytokines in response to infection or injury and the central immune responses that result in sickness behaviors that include neurocognitive symptoms.

MATERIALS AND METHOD

Literature review of more than 80 articles in order to assess this issue from neurobiological, imaging, psychiatric point of view.

RESULTS

The acute response from the inflammatory point of view is initiated when the macrophages are activated by pathogen invasion or tissue damage, resulting in the release of several proinflammatory cytokines including interleukin-10 (IL-10), interleukin-6 (IL-6) and tumor necrosis

factor- α (TNF- α). They have several functions, including stimulating the expression of epithelial adhesion molecules, increasing vascular permeability, and supporting leukocyte trafficking through chemo-tactic signaling. Pro-inflammatory cytokines also enter the peripheral circulatory system and are involved in signaling a systemic inflammatory response characterized by hepatic synthesis and release of acute-phase proteins including C-reactive protein (CRP) [17, 18]. Although TNF- α and IL-1B decay rapidly, IL-6 and CRP have longer half-lives and are reliably detected in human plasma serum, but they are less specific. In the absence of acute infection, it is widely accepted that circulating concentrations of IL-6 and CRP reflect an index of chronic system extended inflammation at the time of the blood sample collection. Generally stable over extended periods, circulating levels of IL-6 and CRP increase with age and predict risk for accelerated cognitive decline among elderly populations [19]. For example, the transgenic mice that overexpress central levels of IL-6 show deficits in synaptic plasticity and impaired avoidance learning [20] and the administration of IL-6 receptor antagonists to normal mice prevents the decreases in hippocampal LTP and neurogenesis, and the subsequent cognitive sequelae that accompany peripheral and central inflammation [21]. Taken together, these findings may suggest that proinflammatory cytokines play a critical role in modulating the neuro-molecular processes that underlie cognitive processes (like learning and memory).

Other studies show that chronic stress results in an increase in peripheral inflammation that sensitizes or 'primes' a proinflammatory shift in microglial phenotype, resulting in an increase in central proinflammatory cytokines and concomitant deficits in learning and memory [22, 23]. Also, on mice subjects, that were exposed to social isolation over a 4-week period, is showed an elevated level

of hippocampal IL-1F. Moreover, is present a decreased hippocampal neurogenesis and specific impairment of hippocampal-dependent memory [24]. These data may suggest that age-related elevations in systemic inflammation affect cognitive function [25]. The aging process was associated also with proinflammatory cytokine expression in the periphery [26], IL-6 levels increase in hippocampal and prefrontal brain regions [27] and activation of microglia [28]. This may be plausible because we also know that the microglial cells and macrophages are derived from common progenitor cells and serve analogous roles in their respective systems [21]. When activated by proinflammatory cytokines, the microglial cells adopt an inflammatory phenotype that resembles with an activated macrophage (including the expression of surface antigens and the production of central proinflammatory cytokines) [22-24]. This may be important for neurocognitive processes because the receptors for proinflammatory cytokines are highly expressed on microglia found in the hippocampus and prefrontal brain regions [29-34]. This elevations in central proinflammatory cytokines interfere with a variety of neuro-molecular processes, including hippocampal neurogenesis, synaptic plasticity and synaptic scaling [35] thus eventually result in dendritic atrophy with negative consequences for learning and memory [36]. Moreover, we know that the central administration of IL-1 impairs performance on some cognitive and memory functions, but not on hippocampal-dependent spatial learning tasks [37, 38]. In conclusion, the animal studies evidences, suggest that age-related microglial activation results in exaggerated central responses to peripheral inflammation, which may play a role in the neurocognitive decline that accompanies aging [39].

In the line of experimental and epidemiologic research humans, several independent studies support a role of inflammation in the modulation of

cognitive function. The most used methodology involves examining changes in cognitive performance that accompany the peripheral administration of an inflammatory stimulus. For example, in an early study were administered IOW dose of Salmonella endotoxin and on another line placebo, to 20 male volunteers in a double-blind balanced crossover design [40]. When compared with response to saline IOW, endotoxin had some significant impairments in cognitive performance [40]. Moreover, the effect was dependent on the level of the IL-6, with higher responses predicting the greatest impairments in performance. Similar results were reported in subsequent studies that examined the impact of low-dose Escherichia coli endotoxin vaccination [26]. These data were confirmed by Brydon et al with the typhoid vaccination, respectively [41]. Both studies found inverse associations of IL-6 production and performance on declarative memory and executive function tasks. Finally, more direct evidence for a role of IL-6 comes from a study conducted by Spath Schwalbe et al and his team, which demonstrated that peripheral administration of recombinant IL-6 decreased self-reported attentional capacity when compared to placebo [42]. In this direction of research there is a growing literature that suggests an association of proinflammatory cytokines with normative variation in cognitive function. While the specific assessments of cognitive ability may vary, several studies show inverse associations of proinflammatory markers and cognitive functioning [43- 46]. But not all results are consistent and a possible reason for these inconsistencies is unclear, but it is speculated that age may play a moderating role on the progressive increases in peripheral inflammation that occur across adult life accelerating neurocognitive aging [47- 50]. However, to date, most studies have examined these associations in the elderly when issues relating to differential

survivorship and existing health conditions complicate the picture.

We can also have some insights from studies of neurodegenerative diseases that typically involve deficits in memory (including Alzheimer's disease and vascular dementia). These syndromes are generally associated with higher than normal circulating levels of CRP, IL-6, and IL-1β [24, 51]. For example, Zuliani and his team showed that compared to healthy individuals, those diagnosed with dementia had higher levels of circulating TNF-α, IL-1β and IL-6 [51]. So, it is plausible that elevations in peripheral cytokines may reflect a consequence, rather than a cause, of neurodegenerative processes [52]. The studies with a longitudinal design showed that peripheral inflammation predicts future cognitive declines and subsequent risk for Alzheimer's disease and other dementias [53]. For example, a recent study showed that people with a chronic inflammatory condition like rheumatoid arthritis, have associated elevated levels of IL-6 (when compared to healthy participants) and have a 1.96-fold greater risk for developing mild cognitive impairment and a 2.43-fold increased risk for developing Alzheimer disease over a 20-year follow-up period [54]. These data are confirmed by others studies that shows that midlife levels of circulating CRP and production of and TNF-α by stimulated peripheral blood cells have been positively linked with risk for Alzheimer's disease and vascular dementia in late life [55, 56] but the data from literature that suggest that inflammation predicts future risk for dementia, is not consistent, because in the Framingham Heart Study, the plasma CRP levels was unrelated to dementia risk among older adults followed over a 13 - year period [56].

In this context the findings from longitudinal studies that examine inflammation in midlife are more consistent because they show that accelerated patterns of cognitive decline and increased risk for dementia accompany

higher levels of systemic inflammation [55, 57]. The levels IL-6 and cognitive performance have been reported to be from the first findings to show an inverse association of plasma IL-6 with working memory, attention and executive function among healthy middle-aged adults [58]. Other studies conducted among older adults have suggested that inverse associations of IL-6 with cognitive function are independent of other established risk factors of cognitive decline, including hypertension.

These findings contribute to a growing data that links chronic inflammation to less cognitive functioning in domains that show the largest age-related declines and extend these findings to a midlife people. So, it raises the possibility that circulating levels of are a biomarker of future risk for accelerated cognitive aging, but this must be confirmed by a study specially designed for this. Until now, we know that cognitive function may influence lifestyle choices and health behaviors, but in what measure the cognitive function and systemic inflammation could be related to a third independent factor, such as genetic vulnerability or subclinical neuroinflammatory processes? An answer to this question may come from prospective longitudinal studies that are following individuals over time to elucidate the direction of observed effects. We found in the literature a recent diffusion tensor imaging (DTI) study conducted by Wersching and his team [59], which reported a similar inverse association of CRP with global fractional anisotropy (FA) and regional FA scores in the frontal lobes. Water molecule movement that is perpendicular to the length of the axon (radial diffusivity) is compared to movement that is parallel (axial diffusivity). The asymmetry in molecule movement is believed to reflect global characteristics of the tract, including fibrosis, axonal diameters, and myelination [60]. This approach is typically used to show white matter

microstructural integrity and is based on differential patterns of water molecule diffusion occurring along the length of axons [61]. This technique offers some promising results in elucidating the link between specific neural networks that may be vulnerable to cytokine related disruptions. Taken together, these findings provide further support for a neurobiological pathway linking inflammation to brain networks implicated in learning, memory and executive function.

Other studies have extended the assessment of inflammation-related brain structure to an examination of white matter hyperintensities (WMH), providing a marker of white matter damage and lesions [62]. The older the subjects the higher is the WMH value [63]. WMH have been proven to predict future incidence of stroke, dementia, cognitive decline, and death [64]. In the study of Satizabal and his team, they assessed plasma levels of IL-6 and CRP levels in 1841 adults after a structural MRI [65]. Consistent with other findings [66], they discovered that IL-6 higher levels would show lower grey matter volume of the hippocampus and this has been linked to memory impairments [67]. The possibility that inflammatory processes play a role in age related increases of WMH has been the focus of several recent investigations [68, 69]. Additionally, IL-6 and to a lesser extent CRP, were positively associated with WMH volume. A similar inverse association of CRP With WMH was also found in the Rotterdam Scan Study [70]. Also, a recent study by Furney and his team, examined the contribution of structural MRI results and inflammation to the predict the risk for dementia. Although cytokine levels and MRI findings contributed independently to the prediction of risk, a model that combined them both accounted for greater predictive variance [71]. There are many proofs that inflammation plays a role in the future progression of dementia and these findings raise the question if the traditional

structural MRI techniques may not adequately detect the entirety of inflammatory-related effects.

From the studies, we also observed an inverse association of IL-6 levels with performance of the executive function tasks that involve the prefrontal cortex (like set shifting or cognitive flexibility), the working memory tasks that involve the prefrontal cortex and hippocampus, and on attentional capacity tasks that typically involve global neurocognitive function. It is also possible that inflammation may induce progressive global brain alterations, with declines in executive function and attention/working memory being early effects [72, 73]. In addition to these findings, exploratory whole brain analyses revealed an inverse association of peripheral IL-6 levels with grey matter volume in the prefrontal cortex. This association is consistent with the literature, showing associations of IL-6 with cognitive performance on tasks involving working memory and executive function that typically recruit prefrontal regions [58]. Also, the activation of central inflammatory processes results in hippocampal remodeling, particularly neurodegeneration and atrophy [74]. To the extent that hippocampal atrophy plays a role in memory-related deficits, these results further support the possibility that systemic inflammation may play a role in age-related declines in learning and memory. The functional neuroimaging studies suggest that a network of brain regions is activated while encoding stimuli that are subsequently remembered, and these regions include the prefrontal cortex along with hippocampal areas [75]. These findings are a good starting point for future investigation to further studies on this matter.

High BMI is also associated with age-related cognitive declines [76] and risk for future dementia [77] and thus it is plausible that interventions aimed at reducing adiposity may protect against cognitive impairment. In addition to

immune cells, adipose tissue is a key contributing source of proinflammatory mediators, including IL-6. While weight loss by dieting and bariatric surgery has been associated with reductions in peripheral inflammation [78], it is unknown whether the magnitude of these effects conveys protection against accelerated cognitive aging.

These findings may suggest, that anti-inflammatory drugs can restore hippocampal neurogenesis in rats and some human epidemiological evidence suggests that nonsteroidal anti-inflammatory drugs may slow the progression of memory loss in patients with dementia and decrease the future risk for Alzheimer's disease. Until now, most of these clinical trials have focused on secondary prevention in elderly populations who are already diagnosed with dementia. With results from a recent study showing that anti-inflammatory drug use protects against age-related atrophy of grey and white matter among older women [79]. However, not all findings are consistent on this subject. There are clinical trials that show no benefit of NSAIDs in preventing cognitive decline in patients with dementia [80]. It remains to be determined whether NSAIDs are beneficial if provided earlier in the disease course, but the initial evidence suggests that this may be the case.

In addition to biobehavioral and lifestyle choices, psychosocial characteristics including chronic stress and clinical depression have been shown to influence peripheral inflammatory activity. Evidence shows that chronic psychological stressors, including low socioeconomic status, loneliness, and caregiving for a terminally ill family member, are associated with increased systemic inflammation [81]. Psychological stress has also been linked to poorer cognitive function, and with stress hormones including cortisol thought to play a role in modulating hippocampal processes [82]. The possibility that inflammation mediates associations of

chronic stress and cognitive function remains to be determined.

There are several limitations of the current literature that will be corrected by the future studies. While some prospective longitudinal designs have been utilized, studies investigating associations of inflammation and cognitive function are largely cross-sectional, precluding causal interpretations. Animal studies support the role of inflammation in modulating cognitive performance, however the reverse is also a possibility with elevations in peripheral inflammation from neurodegenerative processes in the CNS, but this can also be a 'spillover' effect (83). It is also possible that associations may stem from a third factor, possibly relating to individual differences in genetics.

Another limitation of the current literature is the use of single set assessments of inflammatory markers. Evidence suggests that these markers are relatively stable over extended periods [84], however, multiple factors are known to impact circulating levels of inflammatory mediators, including acute inflammatory disease, psychological stress, and physical activity [85]. Thus, a more reliable assessment of stable individual difference would be derived from assessing means across multiple testing occasions.

CONCLUSIONS

The studies cited in this article may suggest that biological markers of inflammation can predict future cognitive decline risk, because recent human studies combining different markers of inflammation, neuroimaging methods and cognitive tests and are consistent with the studies on animal model and show that

inflammation contributes to lower cognitive performance over and above more traditional cardiovascular risk factors, including education, hypertension, metabolic factors, smoking, subclinical atherosclerosis and symptoms of cardiovascular peripheral inflammation and cognitive aging disease [85]. In addition to biobehavioral and lifestyle choices, psychosocial characteristics including chronic stress and clinical depression have been shown to influence peripheral inflammatory activity. It remains to be determined whether NSAIDs are beneficial if provided earlier in the disease course, but the initial evidence suggests that this may be the case.

Because the inflammation varies significantly in later life and the elderly have also more cardiovascular risk factors, the prediction of cognitive aging it is very difficult to be done by isolating only one contributor. Thus, it is likely that profiles will be of greater use in the future prediction of risk. But we know for sure that a high BMI is also associated with age-related cognitive declines and risk for future dementia and thus it is plausible that interventions aimed at reducing adiposity may protect against cognitive impairment. Further prospective studies are needed to be done, decade by decade from beginning of adulthood to the eight decades of life, in order to better understand the effects of inflammation on the brain structure and cognitive function. Then we can understand whether variation in systemic inflammation among adults contributes to risk for accelerated cognitive decline and dementia, shedding more light on human cognitive aging processes.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Huh TL, et al. *Response bias and aging on a recognition memory task*. Int J Neuropsychol Soc 2006; 12:1-7.
- [2] Wecker NS, et al. *Mental flexibility. age effects on switching*. Neuropsychology 2005; 19:345-352.

- [3] Davis HP, et al. *Acquisition, recall, and forgetting of verbal information in long-term memory by young, middle-aged, and elderly individuals.* Cortex 2003;39:1063-1091.
- [4] Buckner RL. *Memory and executive function in aging and AD: multiple factors that cause and reserve factors that compensate.* Neuron 2004;44:195-208.
- [5] Salthouse TA, et al. *When docs age-related cognitive decline begins?* Neurobiol Aging 2009;30:500-520.
- [6] Barberger-Gateau, et al. *Functional impairment in instrumental activities of daily living: an early clinical sign of dementia?* J Am Geriatr Soc 1994;47:450-464.
- [7] Yaffe K, et al. *Metabolic syndrome and cognitive disorders: is the sum greater than its parts?* Dis Assoc Disord 2007;21:167-170.
- [8] Yaffe K, et al. *metabolic syndrome inflammation and risk of cognitive decline.* JAMA 2004;292:2237.
- [9] Brown GC Neher JJ et al. *Inflammatory neurodegeneration and mechanisms of microglial killing of neurons.* Mol Neurobiol 2010;41:242-247.
- [10] Bluthe RM, et al. *Synergy between tumor necrosis factor alpha and interleukin-1 in the induction sickness behavior in mice.* Psychoneuroendocrinology 1994;19:197-207.
- [11] Rachal Pugh C, et al. *The immune system and memory consolidation: a role for the cytokine IL-1 beta.* Neurosci Biobehav Rev 2010;25:29.
- [12] Dantzer R, et al. *Cytokine-induced sickness behavior: a neuroimmune response to activation of innate immunity.* Eur J Pharmacol 2004;500:399.
- [13] Lee JW, et al. *Neuroinflammation induced by lipopolysaccharide cause cognitive impairment through enhancement of beta-amyloid.* J Neuroinflammation 2008;5:37.
- [14] Ek M, et al. *Inflammatory pathway across blood-brain barrier.* Nature 2001;410:430.
- [15] Tracey KJ, et al. *The inflammatory reflex.* Nature 2002;420:835.
- [16] Laflamme N et al. *Effects of systemic immunogenic insults and circulating proinflammatory cytokines on the transcription of the inhibitory factor kappaB alpha within specific cellular populations of the rat brain.* J Neurochem 1999;73:309-321.
- [17] Heinrich et al. *Interleukin-6 and the acute phase response.* Biochem J 1990;256:621.
- [18] Bataille R. Klein B. *C-reactive protein levels as a direct indicator of interleukin-6 levels in humans in vivo-Arthritis Rheum* 1992;35:982.
- [19] Maggio M, et al. *Interleukin in aging and chronic disease: a magnificent pathway.* J Gerontol A Biol Sci Med Sci 2006;61:575-584.
- [20] Heyser CJ, et al. *Progressive decline in avoidance learning paralleled by inflammatory neurodegeneration in transgenic mice expressing interleukin 6 in the brain.* Proc Natl Acad Sci USA 1997;94:1500.
- [21] Balschun D, et al. *Interleukin-6: a cytokine to forget.* FASEB J 2004;18:1788.
- [22] Frank MG, et al. *Microglia serve as a neuroimmune substrate for stress induced potentiation of CNS proinflammatory cytokine responses.* Brain Behav Immun 2007;21:47.
- [23] Perry VB. Cunningham C, Holmes C. *Systemic infections and inflammation affect chronic neurodegeneration.* Nat Rev Immunol 2007;7:161-167.
- [24] Ben Menachem-Zidon O, et al. *Intrahippocampal transplantation of transgenic neural precursor cells overexpressing interleukin-1 receptor antagonist blocks chronic isolation-induced impairment in memory and neurogenesis.* Neuropsychopharmacology 2008;33:2262.
- [25] Simmen AA et al. *Cognitive dysfunction with ageing and the role of inflammation.* Adv Chron Dis 2011;2:175-195.
- [26] Krabbe KS et al. *Inflammatory mediators in the elderly.* Exp Gerontol 2004;39:687.
- [27] Ye SM et al. *Increased interleukins expression by neuroglia from brain of aged mice.* J Neuroimmunol 1999;93:139.
- [28] Perry V H , Matyszak MK. Fearn S. *Altered antigen expression of microglia in the aged rodent CNS.* Glia 1993;7:60-67.
- [29] Aloisi F. *Immune function of Microglia.* Glia 2001;36:165.
- [30] Dickson DW, et al. *Micro-glia and cytokines in neurological disease, with special reference to AIDS and Alzheimer's disease.* Glia 1993;7:75.
- [31] Hanisch U K. *Microglia as a source and target of cytokines.* Glia 2002;40:140-155.
- [32] Gadenne RA, et al. *Expression of interleukin-6 (IL-6) and interleukin-6 receptor mRNAs in rat brain during postnatal development.* Brain Res 1994;637:10-14.
- [33] Vallieres L et al. *Reduced hippocampal neurogenesis in adult transgenic mice With chronic astrocytic production of interleukin-6.* J Neurosci 2002;22:492.
- [34] Vitkovic L, et al. *Cytokine signals propagate through the brain.* Mol Psychiatry 2000;5:604.
- [35] McAfoose J, et al. *Evidence for a cytokine model of cognitive function.* Neurosci Biobehav Rev 2009;33:355-366.
- [36] Yirmiya R, et al. *Immune modulation of learning, memory, neural plasticity and neurogenesis.* Brain Behav 2011;25:181.

- [37] Lacosta S, et al. *Influence of acute and chronic repeated interleukin-2 administration on spatial learning, locomotor activity, exploratory behaviors, and anxiety.* Behav Neurosci 1999;113:1030.
- [38] Gibertini M. *Cytokines and cognitive behavior.* NeurolImmunoModulation 1998;5:165.
- [39] Sparkman N, et al: *Neuroinflammation associated with aging sensitizes the brain to the effects of infection or stress.* NeurolImmunoModulation 2008;15:323.
- [40] Reichenberg A, et al. *Cytokine associated with emotional and cognitive disturbances in humans.* Arch Gen Psychiatry 2001;58:445.
- [41] Brydon L, et al. *Synergistic of psychological and immune stressors on cytokine and sickness responses in humans.* Brain Behav 2009;23:217-224.
- [42] Spath-Schwalbe E, et al. *Acute effects of recombinant human interleukin-6 on endocrine and central nervous sleep functions in healthy men.* J Clin Endocrinol Metab 1998;83:1573.
- [43] Teunissen CE, et al. *Inflammation markers in relation to cognition in a healthy aging population.* J Neuroimmunol 2003;134:142-147.
- [44] Tilvis R.S. et al. *Predictors Of cognitive decline and mortality of people over a 10-year period.* J Gerontol A Biol Sci Med Sci 2004;59:268.
- [45] Weaver JD, et al. *Interleukin-6 and risk of cognitive decline: MacArthur studies of successful aging.* Neurology 2002;59:731-380.
- [46] Yaffe K, et al. *Inflammatory markers and cognition in well-functioning Afro-American and white elders.* Neurology 2003;61:76-80.
- [47] Alley et al. *Inflammation and rate of cognitive change in high-functioning older adults.* J Gerontol A Biol Sci Med Sci 2008;63:50-55.
- [48] Dick MG, et al. *Contribution of metabolic syndrome components to cognition in older individuals.* Diabetes Care 2007;30:2650-2660.
- [49] Gustafson DR, et al. *37 years of body mass index and dementia: observations from the prospective population study of women in Gothenburg, Sweden.* J 2012;28:163-171.
- [50] Hoozemans JL et al. *Neuroinflammation in disease wanes with age.* J Neuroinflammation 2011;8:171.
- [51] Zuliani G, et al. *Plasma cytokines profile in older subjects with late onset Alzheimer's disease or vascular dementia.* J Psychiatr Res 2007;41:686-696.
- [52] Licastro F, et al. *Increased plasma levels of IL-1, IL-6 and $\alpha 1$ antichymotrypsin in patients with Alzheimer's disease: peripheral inflammation or signals from the brain?* J Neuroimmunol 2000;103:97-102.
- [53] Engelhart MJ, et al. *Inflammatory proteins in plasma and the risk of dementia: the Rotterdam study.* Arch Neurol 2004;61:668-672.
- [54] Wallin K. et al. *Midlife arthritis increases the risk of cognitive impairment two decades later: a population based study.* Alzheimers Dis 2012;31:669-676.
- [55] Schmidt R, et al. *Early inflammation and dementia: a 25-year follow-up Of the Honolulu-Asia Aging Study.* Ann Neurol 2002;52:168.
- [56] van Himbergen TM, et al. *Biomarkers for insulin resistance and inflammation and the risk for all-cause dementia and Alzheimer disease results from the Framingham Heart Study.* Arch Neurol 2012;69:595-600.
- [57] Laurin D, et al. *Midlife C-reactive protein and risk of cognitive decline: a 31year follow-up.* Neurobiol Aging 2009;30:1724.
- [58] Marsland AL, et al. *Interleukin-6 covaries inversely with cognitive performance among middle-aged community volunteers.* Psychosom Med 2006;68:895-903.
- [59] Wersching H, et al. *Serum C-reactive protein is linked to cerebral microstructural integrity and cognitive function.* Neurology 2010;74:1022-1030.
- [60] Le Bihan D, et al. *Diffusion tensor imaging: concepts and applications.* J Magn Reson Imaging 2001; 13:534.
- [61] Hagmann P, et al: *Understanding diffusion MR imaging techniques: from scalar diffusion-weighted imaging to diffusion tensor imaging and beyond.* Radiographic 2006;26(suppl 1): S205-223.
- [62] Fazekas F, et al. *Pathologic correlates of incidental MRI White matter signal hyperintensities.* Neurology 1993;43:1683-1689.
- [63] Gunning-Dixon FM, et al. *Aging of cerebral white matter: a review Of MRI findings.* Int J Geriatr Psychiatry 2009;24:109-118.
- [64] DeBette S, Markus HS. *Clinical importance of white matter hyperintense sites on brain magnetic imaging: systematic review and metanalysis.* BMJ 2010;341:3666
- [65] Satizabal CL et al. *Circulating IL-6 and CRP are associated with MRI findings in the elderly: the 3C-Dijon Study.* Neurology 2012;78:720-727.
- [66] Marsland AL, et al. *Interleukin4 covaries inversely with hippocampal grey matter volume in middle-aged adults.* Biol Psychiatry 2008;64:484.
- [67] Reitan RM. et al. *The Halstead-Reitan Neuropsychological Test Battery Tucson.* Neuropsychopharmacology Press, 1985

- [68] Banne BTs et al. *Association between cytokines and cerebral MRI changes in the aging* J Geriatr Psychiatry Neurol 2009;22:23-34.
- [69] Miralbell J, et al. *Structural brain changes and cognition in relation to markers of vascular dysfunction.* Neurobiol Aging 2012;33:22.
- [70] van Dijk EJ, et al. *C-reactive protein and cerebral small-vessel disease: the Rotterdam Scan Study.* Circulation 2005;112:900-905.
- [71] Furney SJ, et al. *Combinatorial markers of mild cognitive impairment conversion to Alzheimer's disease-cytokines and MRI measures together predict disease progression.* J Alzheimer's Dis 2011;3:395-405.
- [72] Jack CR Jr, et al. *Rates of hippocampal atrophy correlate with change in clinical status in aging and AD.* Neurology 2000;11:805-821.
- [73] Mattay VS, et al. *Neurophysiological correlates of age-related changes in working memory capacity.* Neurosci Lett 2006;392:32-37.
- [74] Toda H et al. *Inflammatory blockade restores adult hippocampal neurogenesis.* Science 2003;302:1760.
- [75] Wagner AD, et al. *Building memories: remembering and forgetting of verbal experiences as predicted by brain activity.* Science 1998;281:1180.
- [76] Fitzpatrick AL, et al. *Midlife and late-life obesity and the risk of dementia: cardiovascular health study.* Arch Neurol 2009;66:336-342.
- [77] Ward MA, et al. *The effect of body mass index on global brain volume in middle-aged adults: a cross sectional study.* BMC Neurol 2005;5:23.
- [78] Forsythe LK, Wallace JM, Livingstone MB. *Obesity and inflammation: the effects of weight loss.* Nutr Res Rev 2008;21:117-133.
- [79] Walther K, et al. *Anti-inflammatory drugs reduce age-related decreases in brain volume in cognitively normal older adults.* Neurobiol Aging 2011;32:497-505.
- [80] Jaturapatporn D, et al. *Aspirin, steroidal and non-steroidal anti-inflammatory drugs for the treatment of Alzheimer's disease.* Cochrane Database Syst Rev 2012;2:cd006378.
- [81] Kiecolt-Glaser JK, et al. *Chronic stress and age-related increases in the proinflammatory cytokine IL-6 and IL-1.* Proc Natl Acad Sci USA 2003;100:9090.
- [82] McEwen BS, Sapolsky RM. *Stress and cognitive function.* Curr Opin Neurobiol 1995;5:205-216.
- [83] Meyer JS, et al. *Risk factors for cerebral hypoperfusion, mild cognitive impairment, and dementia.* Neurobiol Aging 2000;21:161-169.
- [84] Rao KM, et al. *Variability of plasma IL-6 and crosslinked fibrin dimers over time in community dwelling elderly subjects.* Am J Clin Pathol 1994;102:802.
- [85] Schram MT, et al. *Systemic markers of inflammation and cognitive decline in old age.* J Am Geriatr Soc 2007;55:708-716.

STRESSFUL LIFE ELEMENTS IN OLDER PEOPLE

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Abstract. There are many kinds of stressful elements in everyone's life. There may be events already happened (emotionally processed or not) and some just about thoughts and projections for the future. These negatives expectations can be directed to one's own person or to others. These paper aims to evaluate the frequency and types of this kind of stress. The study was conducted on a group of 402 patients from National Institute of Gerontology and Geriatrics “Ana Aslan” (197 men and 205 women); age group: 55-99 years; average age: 72.41 years. Among the tests we use are the GDS-15, the clock test and the MMSE. The statistical analysis of the data was in the SPSS program. The statistical analysis of the data was done with SPSS program. Results: The most common types of fears in the study are: fear of getting sick and worsening of the existing illness (33.8%), fear of undesirable family events (14.2%), fear of their own death (6.7%), fear of falling (4.5%), fear with no reason in particular (4%), fear of depending on someone else (3.2%), fear of being with no one else (2.7%). Correlation analyzes were carried out between the presence of fears and some social variables, resulting in the following: women are more stressed ($r=0.558$ / $p=0.000$); subjects with higher education level have fewer fears ($r=0.319$ / $p=0.000$); the youngest have more frequent stress ($r= -0.114$ / $p=0.022$). Analyzing separately by gender, between the frequency of fears and the favorable factors, in men there is a significant negative correlation with school education and cognitive level. In women, the order is age (reverse link) and numbers of stresses. Conclusions: In over 50% of cases, the elderly are concerned about various health problems and the problems of family members are perceived as theirs.

Key words: elderly, depression, stress, illness

ELEMENTE STRESANTE ÎN VIAȚA VÂRSTNICILOR

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Rezumat. Există mai multe tipuri de elemente stresante în viață fiecărui om. Pot fi evenimente deja întâmplate (procesate sau nu la nivel emoțional) și unele care țin doar de gânduri și proiecții pentru viitor. Aceste așteptări negative se pot îndrepta către propria persoană sau către alte persoane. Lucrarea își propune să evalueze frecvența și tipurile acestor stresuri. Studiul a fost realizat pe un lot de 402 pacienți din Institutul Național de Gerontologie și Geriatrie “Ana Aslan” (197 bărbați și 205 femei); cu vârste între 55 și 99 ani; vârstă medie: 72.41 ani. Dintre testele utilizate amintim GDS-15, testul ceasului și MMSE. Analiza statistică a datelor s-a realizat în programul SPSS. Rezultate: Cele mai frecvente stresuri apărute sunt: teamă pentru boală și agravarea ei (33,8%), temeri pentru evenimente neplăcute în familie (14,2%), teamă de propria moarte (6,7%), teamă de căderi (4,5%), temeri fără un motiv anume (4%), teamă de a deveni dependent de cineva (3,2%), teamă de a rămâne singur (2,7%). S-au efectuat analize corelazionale între prezența temerilor și câteva variabile sociale, rezultând în ordine, următoarele: femeile sunt mai stresate ($r=0.558$ / $p=0.000$); subiecții cu nivel educațional mai crescut au temeri mai puține ($r=0.0319$ / $p=0.000$); cei mai tineri au stresuri mai frecvente ($r= -0.114$ / $p=0.022$). Analiză separată, pe genuri, între frecvența temerilor și factorii favorizanti, arată la bărbați corelații negative semnificative, cu pregătirea școlară și nivelul cognitiv. În cazul femeilor, ordinea factorilor este: vârsta (corelație inversă) și numărul de stresuri. Concluzii: În mai mult de 50% din cazuri, vârstnicii se preocupă pentru diverse probleme de sănătate, iar problemele membrilor familiei sunt percepute că fiind ale lor.

Cuvinte cheie: vârstnici, depresie, stres, boală

INTRODUCTION

“Aging is not a state, it is a process of gradual and differential degradation, it is an ensemble of phenomena, which appears as a result of the conclusion of the developmental phase, involving biological and psychological changes.” In the aging process, chronological age is not an absolute factor. Chronological age and functional age are two different elements. At the same age people can have different capabilities. Some may also be active at older ages. While others may as early as 50-60 years have a very low efficiency and their activities are limited to a minimum of self-care [1].

When a person evaluate that can't deal to a reality or a possible reality, stress appears. In these situation a person feels that has not enough resources, the well being is disrupted and it is a major risk of complete losing it [2]. A positive attitude regarding the changes that comes leads to an efficient accommodation.

With the aging, stressors appear to feel stronger than in the other stages of life. Vulnerability to stress occurs. Vulnerability is manifested by the decrease of biological resources (chronic and worsening of diseases), psychic (concomitant increase of depending and fear of dependence on environment, family and society), socially (loss of close friends or relatives, retirement, loss of social and family role etc) [3].

There are several types of stressful elements in every person's life. There may be events that already had happen (emotionally processed or not). But they can also be elements that are just thoughts and projections for the future. These negative expectations can be directed to one's own person or to others. The aging process is perceived differently from person to person and “depending on the level of wisdom and experience gained throughout life” [4].

In this period may appear many fears concerning how will be the life of the person, how can overcome the difficulties

arising or to find a way to adapt to new challenges. One of these challenges is the fear of falling. Statistics show that 20-45% of people over 65 years old and almost half of people over 80 years old fall at least once in a year [5]. The cause of the falls may be the equilibrium, cardiovascular pathology [6], fragile health, dizziness, low mobility etc.

As he gets older, the feeling of frailty, vulnerability appears. “The concept of frailty has the capacity to draw attention to those elderly people at high risk of becoming dependent of someone else and to present other types of unfavorable prognosis - hospitalization, institutionalization, death” [7].

This feeling is accented because they notice that everything they have done until “now”, currently they make it more difficult, more slowly or he can not do. This degradation of strength and capacity to self-care emphasizes the feeling that is vulnerable and fear that may come a time when he can no longer can take care of him.

The illness or aggravation of the disease represents a problem and by the risk included to lose the physical autonomy, reaching to depend on anyone. By this dependence, in addition to suffering from the loss of autonomy, there is also the pain that burdens others by expressing the feeling of guilt.

The aim of this paper is to evaluate the stresses frequency and types appeared in this stage of life.

MATERIAL AND METHOD

The study group of 402 subjects (205 women and 197 men) aged between 55-99 years and the average age of 72.41 years.

The tests applied: MMSE 30 items and GDS 15 (Geriatric Depression scale, short form, 15 items)

The data was processed statistically with the program SPSS, using mainly Pearson correlation analysis.

RESULTS AND DISCUSSIONS

The lot is balanced in terms of distribution over large age groups (55-74 years and 75-

99 years) and genders, both in total and in age groups (see Fig. 1).

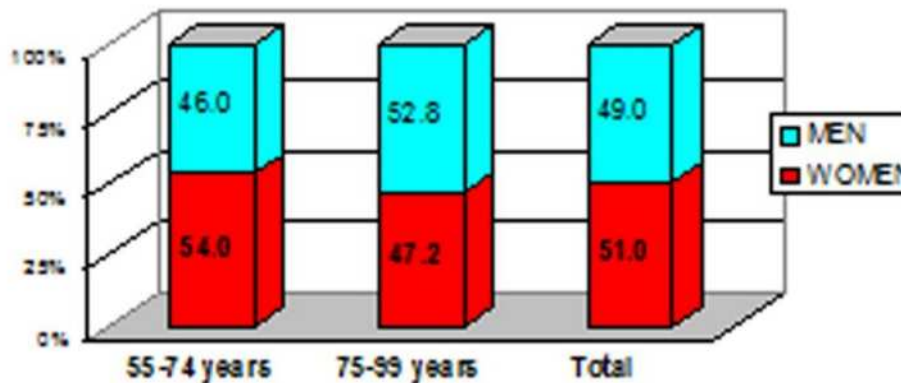


Fig.1 Distribution of age groups by gender

a) Marital status of the subjects

Of the total number of subjects:

-235 are married or in a relationship, (64.7% men and 35.3% women).

-113 live alone (27.4% of men and 72.6% of women).

-179 subjects live together with their wife/husband, (63.45% men and 26.3% women)

- the rest of the subjects live many people in the same house, along with their partner and / or other people (child, parent, nephew, other types of relatives).

The group of single persons (widows) is: - 111 widowed women, 10 separated and 1 never married and -39 widowed men, 5 separated and 1 never married. A percentage of 1.7% lost their partner for 28 years or more. And 20% are widows for a period of 2-14 years.

The number of children alive is an important variable in assessing social support. Of the group's subjects, 76% have up to 2 children, 18% have three or more children. Only 6.5% have no (more) children at present.

b) Sample distribution of the tuition level
10% have up to 4 grades, 20% have up to 8 grades, 20% have completed their vocational school, 22% have completed high school, 11% have completed a technical or post-secondary school and 16.2% have completed university studies.

c) The distribution of psycho-cognitive disorders

Diagnosis of depression in this lot, according to GDS: 60% normothymic subjects, 28.9% moderate depression and 11.2% subjects have severe depression. Weight of cognitive impairment: 79% - no disorders; 4% light weight; 17% moderate disorders.

d) The weight of fears of subjects

Out of the total group of 402 people, 36.8% said they were not afraid of anything and did not even think that something bad could happen. They have a relaxed attitude, with no negative expectations for the future.

Most of those who fear or have negative feelings from the future (42.5% of the 402 group) say they worry only one thing. But 20.7% have many stressors for which they are often worried (e.g. not to aggravate their own illness and not to happen something with their partner and grandchildren, etc.)

By gender (Fig. 2), fears appear in 36.9% of men (40.0% single and 35% of married) and 89.8% of women (88.5% single and 91.6% married).

By age, the differences are small: 65.2% in the 50-74 age group and 61.2% in the 75-99 year group (Fig. 3). Fears appear in 54.9% of married and 75.4% of single people (Fig. 4).

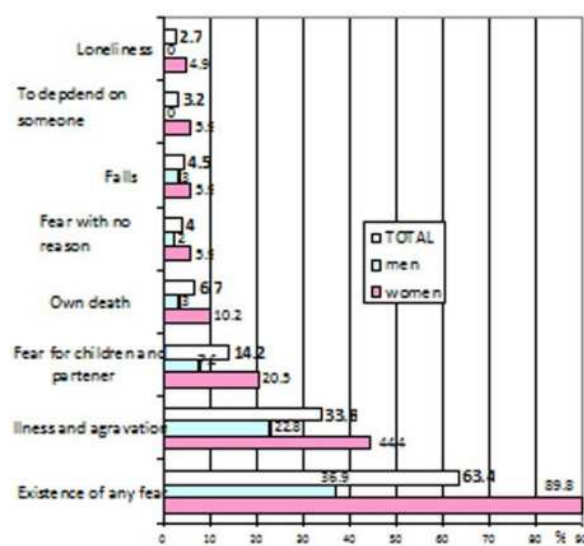


Fig.2 Stress distribution by gender

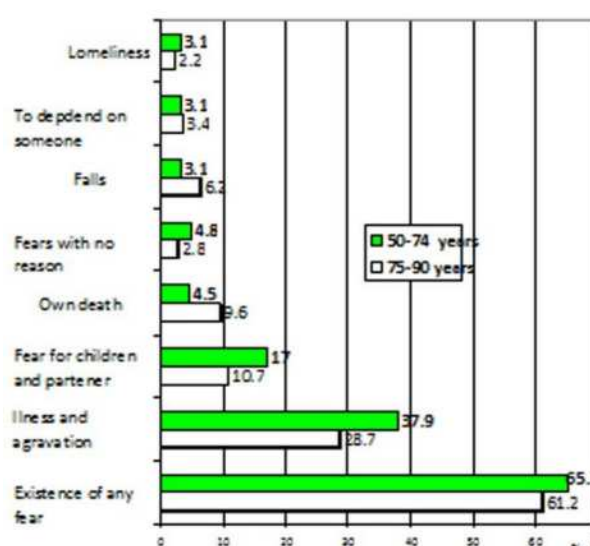


Fig.3 Stress distribution by age

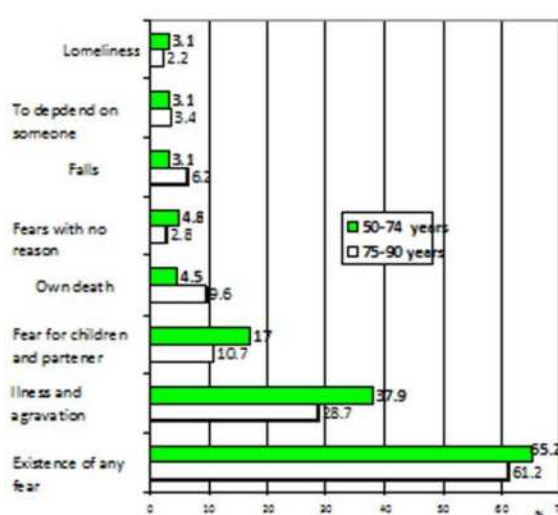


Fig.4 Stress distribution by marital status

The most common fear is to not get sick or worsen the already existing illness, in the case of 33.8% of the total subjects (44.4% in women and 22.8% of men).

Of those who respond positively to the question, “Are you afraid that something bad might happen to you?” 14.2% think of someone other than they own, usually husband, children, grandchildren. (20.5% women and men only 1/3 of the percentage of women); 6.7% of the subjects are afraid of dying (women 3 times higher than men). Most of the time, fear is transcended by the fear of dying alone or of suffering, rather

than of the event itself. 4.5% worry about the possibility of falling, which limits their area of travel and increases the need to be accompanied; 3.2% live with fear that they might become dependent to someone, and thus end up tormenting someone, especially children.

Correlation Analysis

I. Large lot analysis

In this section, the GDS-6 item (which signals global fears), the more frequent stresses expressed by the subjects, and the “feeling of loneliness” item are related to a

few social variables (age, gender, home environment, marital status, education level, number of children in life) and a psychological variable (cognitive disorders).

The correlation analysis between gender and item GDS-6 expresses a strong correlation ($r=0.558$ / $p=0.000$), which is evident in the descriptive analysis in Fig. 2, where the global weight of stress in women is 2.4 times the weight of stress in men. Still the women are those who have different stresses at the same time ($r=0.489$ / $p=0.000$). The most common fears that characterize them are: the stress of the disease ($r=0.228$ / $p=0.000$), the family care ($r=0.184$ / $p=0.000$), the stress of one person's dependence ($r=0.151$ / $p=0.002$) and fear of loneliness ($r=0.134$ / $p=0.007$). The feeling of loneliness is more experienced by women ($r=0.263$ / $p=0.000$) than men.

Looking at age, younger people worry more frequently than older people ($r=0.114$ / $p=0.022$) and may have more worries at the same time. The worries that correlate with age are only those for the family and the possibility of getting sick ($r= -0.104$ / $p=0.036$, respectively $r= -0.103$ / $p=0.039$). These fears also appear in Fig. 3 as the most common. Older people report more often the feeling of loneliness ($r=0.156$ / $p=0.002$). In Fig. 4, the share of fears of single person is higher, 75.4%, compared to 54.9 %, the share of fears of those married.

In the widowed or divorced group, significant correlations are with GDS-6: ($r= -0.210$ / $p=0.008$); with fear for his own death. ($r= -0.157$ / $p=0.002$), fear of loneliness ($r= -0.137$ / $p=0.006$) and fear to depend on someone ($r= -0.131$ / $p=0.002$). Those widowed feel the feeling of loneliness more acutely as widowhoods are more ($r=0.164$ / $p=0.002$).

A significant correlation also occurs in those who have children ($r=0.105$ / $p=0.036$): they are more concerned about the family ($r=0.0112$ / $p=0.025$) than for their own person.

Other significant links arise between the fears and the school level: those with less school are fearful ($r=0.0319$ / $p=0.000$ - correlation with GDS-6).

The correlation with the number of fears we find that more worries exist in those with fewer classes ($r=0.246$ / $p=0.000$).

There are significant correlations with disease or worsening of the disease ($r=0.0280$ / $p=0.000$), loneliness ($r=0.150$ / $p=0.003$) and fear of loneliness ($r=0.123$ / $p=0.013$).

The last significant relationship for the whole lot is between family concern and better cognitive efficiency.

II. Analysis by gender

In men, the fears globally evaluated through item 6 of the GDS are significantly higher in those with less school education ($r= -0.303$ / $p=0.000$) and in those with median cognitive efficacy ($r=0.173$ / $p=0.0155$). In women's case, GDS-6 correlates significantly with school education ($r= -0.200$ / $p=0.004$) and age (younger, more frightened).

The feeling of loneliness correlates first, for both sexes, with marital status ($r= -0.367$ / $p=0.000$ for males and $r= -0.298$ / $p=0.000$ for females). On the second place is the inverse correlation with the number of graduated classes in men, and in the case of women, the relationship with lone efficacy. The correlation "loneliness - the age" has approximately the same value for both genres: $r=0.191$ / $p=0.006$). And correlations "loneliness - years of widowhood" have very close values for both genders. ($r=0.186$ / $p=0.008$).

By age groups, the correlation analysis "fears – social variables" does not appear: fear of depending on someone else and the fear with "no reason". Also, in the group of men, we note the lack of fears for family problems and women group, the lack of several fears: the fall, the loneliness, the death.

For men, the first place is the correlation years of widower-fear of loneliness ($r=0.288$ / $p=0.000$). It follows the reverse

relationship between the number of classes and the fear of disease ($r = -0.271$ / $p = 0.000$). And in third place is the link between an average cognitive efficiency and fear of death ($r = 0.214$ / $p = 0.003$).

For women, the first place is occupied by the meaningful direct link “marital status – fears for family problems” ($r = 0.246$ / $p = 0.000$) (married ones worry more). It follows the reverse correlation of the same fears with the number of years of being widows ($r = -0.226$ / $p = 0.001$). More worried are the ones left widows recently. Those with good memory efficiency live more often with the fear that family members may suffer some harm (may get ill, accidents, die etc.) ($r = 0.204$ / $p = 0.003$). Those with moderate memory efficiency tend to experience the feeling of loneliness more frequently ($r = 0.129$ / $p = 0.066$). In the case of women, the fear of illness correlates with the years of schooling: less school, higher fears. The same fears also correlate with the home environment (rural ones are more afraid of illness).

III. Analysis by age groups

We study the age group under the age of 75 years which has 224 people (121 women and 103 men).

When reporting to age, there is a tendency for younger people to worry more than the elderly, and young people also have a greater worries number.

The affirmative answer to the question “Do you fear that something bad can happen to you?” correlates with the female gender ($r = 0.642$ / $p = 0.000$), with subjects with fewer classes ($r = 0.268$ / $p = 0.000$), those who have children ($r = 0.238$ / $p = 0.000$) and with single individuals ($r = 0.222$ / $p = 0.001$), but also with the presence of cognitive disorders evaluated by the clock test ($r = -0.152$ / $p = 0.024$).

Instead, the same question of fear in general in the older group (75 years and over) correlates only with the gender, the number of years of widowhood and schooling.

The presence of loneliness is correlated in both large age groups with variables, in this order: the marital status, the gender and the age of widowhood. In the older group, the correlation with school education appears: the more educated, the feeling of loneliness is weaker ($r = -0.244$ / $p = 0.001$).

Among fears, the fear of the disease correlates in both sub-classes first with the schooling, with almost identical intensities ($r = -0.300$ / $p = 0.000$). Second there is a strong correlation with the gender, stronger in the group of young people ($r = 0.278$ / $p = 0.000$); the value for elderly is only half. In the group of 50-74 years, there are still links to the fear of illness with environment: rural people are more worried about getting ill.

Other stress in the lot is that of family problems: women are the most affected in both age groups. In the group under 75 years, stress also correlates with the presence / absence of children. Fear is more common in people with better cognition.

CONCLUSIONS

The study group is balanced in terms of age group representation (44.3% 55-74 and 53.7%, 75-99), and gender (49% male and 51% women).

The presence of stress was analyzed, in the light of the question “Are you afraid something bad might happen to you?” from the GDS Depression test. Affirmative answers were given by 63.2% subjects, representing 36.9% men and 89.8% women from the whole lot.

In terms of general fears, there are correlations between woman and loneliness (by widowhood or divorced, or by way of habitation), woman and lower school level, woman and good cognitive efficiency. Women are more fearful than men. They do more of their worries at the same time for different issues (at the same time, because something bad can happen to someone in the family and they can get worse). In the case of women, the younger

ones worry about something bad happening and they have many reasons to worry about (for their own person or someone dear). Women in rural areas, those with more children, and those with fewer classes tend to respond more affirmatively that something worries them. Married or widowed women recently worry about more things at a time.

In the men's group, the GDS-6 item significantly correlates with the lower school level and with moderate memory efficiency. There were no correlations with age, marital status, widowhood, or the number of children, as is the case with women.

In lot 55-74 years concerns tend to appear more in young people including as a number of stress at the same time. Women, single people, widow people, those with more children and those with less tuition are more afraid, than other categories, for what might happen.

In the lot over 75 years thereafter women are the ones that, globally, have more frequent stress. Subjects without a partner (widowers or divorced), those who live alone and less tuition feel more vulnerable. Feeling alone: People affected by this feeling are: older people, women (regardless of age), those who live alone and those who have fewer studies.

The composition of samples we analyze includes older and widowed subjects. The category we compare is men to women.

In both cases there is a similar correlation for both lots. As for men and women with good cognitive efficiency they feel just as lonely. The category of vulnerable people who worry that something bad might happen to them: women have most worries

regardless of age, single, widowed, fewer classes. Generally, those with good cognitive efficiency are worrying more.

The most common fears are: fear of illness and aggravation (33.8%), fears for family (14.2%), fear of death (6.7%), fear of falling (4.5%), fears for no reason (4%), fear of becoming dependent by someone else losing his own autonomy (3.2%), fear of having no one (2.7%).

Fear for illness or worsening it is more common in younger people. Women worry more about their health compared to men. The women that feel like this are younger, the ones in the countryside, and those with less school. In the case of men only those who have lower tuition tend to concern themselves with this aspect.

Fears for family: concerns about family members in the big group are highlighted in young people, in women (in any age category) more than in men. The married women, recent widows (especially women) and good cognitive efficiency correlate more frequently with this type of fear. Male correlations do not show any connection with family fears (15 men are afraid that something bad could happen to someone in the family).

By comparing age groups, worry is manifested more strongly in those with good cognitive efficiency and those who have children.

To relieve fears and strain, they can learn to focus on the present, have activities that bring them into contact with their own person, re-evaluation and adaptation to new forces, awareness of needs in the current age, keeping or creating new friends, etc.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Batran D. *Imbatranirea, un process ireversibil*. Revista de Administratie Publica si Politici sociale Arad; 2010, Vol. I, Iss.3, 40-57.
<http://revad.uvvg.ro/files/nr3/ARTICOLUL%204.pdf>

- [2] Ioana R. Podina “Știința rezilienței psihologice la stres” București : Editura Universitară, 2017
[https://www.academia.edu/37686646/%C5%9ETIIN%C5%A2A_REZILIEN%C5%A2EI_PSIHOLOGICE_L
A_STRES](https://www.academia.edu/37686646/%C5%9ETIIN%C5%A2A_REZILIEN%C5%A2EI_PSIHOLOGICE_LA_STRES)
- [3] Riga S, Riga D. *Vulnerabilitate, stres si senescenta. Miscarea si activitatea fizica - factori antiimbatranire.* Palestrica Mileniului III - Civilizatie si Sport 2009, Volumul X, Nr. 1 (35), 7-13.
- [4] Apostiu A. *Imbatranirea activa – O necesitate pentru progresul economic si social.* Revista Romana de Sociologie, 2015 , nr.1-2, 55-72.
<http://www.revistadesociologie.ro/pdf-uri/nr.1-2-2015/04-Andreea.pdf>
- [5] Gerontologie, geriatrie si nursing specific, 6 Caderile. 2016
https://amgtratae.blogspot.com/2016/05/gerontologie-geriatrie-si-nursing_67.html
- [6] Gabriela Șoric, Natalia Blaja-Lisnic, Anatolie Negară, Olga Maniuc, Elena Coșciug, Felicia Lupașcu-Volentir
“Abordarea globală a pacientului varstnic cu caderi” Laboratorul Științific de Gerontologie, USMF „Nicolae Testemițanu” Centrul Național de Geriatrie și Gerontologie
[https://ibn.idsi.md/sites/default/files/imag_file/127.Abordarea%20globala%20a%20pacientului%20virstnic%20
cu%20caderi.pdf](https://ibn.idsi.md/sites/default/files/imag_file/127.Abordarea%20globala%20a%20pacientului%20varstnic%20cu%20caderi.pdf)
- [7] Zamfir MV, Ceuca M, Bogdan C. *Observatii si reflectii asupra conceptului de fragilitate la varstnici.* Revista medicala romana 2014, Vol. LXI, NR. 3, 153-159. [https://rmj.com.ro/observatii-si-reflectii-asupra-
conceptului-de-fragilitate-la-varstnici/](https://rmj.com.ro/observatii-si-reflectii-asupra-conceptului-de-fragilitate-la-varstnici/)

APHASIA IN OLDER PATIENTS. A CASE STUDY

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Abstract. Language is the main way we can express ourselves, speaking or writing we communicate with the others, we need to be able to verbalize, write our wishes, our thoughts, our needs, our feelings. But what happens when we lose this capacity to write / speak? It is necessary for our human being able to communicate. Every day we see people talking on their phones, writing messages, video calls, we are connected through language. This article describes a case study from “Ana Aslan” INGG old patient and the applied therapy. The main reason of the study was that the incidence is growing nowadays and people are more unconscious about what happens to them and why they aren’t able anymore to express themselves, get depressed and don’t try to get help in order to recover. In conclusion, it is important that the evaluation and the condition of the patient, to be made as soon as possible after the stroke. The chance and flexibility is bigger, the disposition is very fragile, and so we need to be able to apply the best type of therapy for each patient.

Key words: language, aphasia, recovery

AFAZIA LA PACIENȚII VÂRSTNICI. STUDIU DE CAZ

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Rezumat. Limbajul reprezintă principala cale de ne exprima, scris sau vorbit, așa comunicăm cu cei din jur sau de departe. Este necesar să fim capabili să verbalizăm, scriem, exprimăm dorințele, gândurile, nevoile, sentimentele. Dar ce se întâmplă când pierdem această capacitate de a scrie / vorbi? Este necesar pentru noi să putem comunica. În fiecare zi vedem în jurul nostru oameni care vorbesc la telefon, scriu mesaje, folosesc apeluri video, suntem conectați cu ajutorul limbajului. Acest articol descrie un studiu de caz al unui pacient internat la INGG “Ana Aslan” și terapia aplicată acestuia. Principalul motiv al acestui studiu este că numărul pacienților cu afazie crește din ce în ce mai mult, iar mulți nu înțeleg de ce sunt în imposibilitatea de a se mai exprima, devin depresivi, retrași și nu încearcă sau nu știu ca își pot recupera, parțial sau chiar în totalitate, capacitățile afectate. În concluzie, este important ca evaluarea și starea pacientului să fie efectuate cât mai curând posibil după accidentul vascular cerebral. Șansa și flexibilitatea sunt mai mari, dispunerea este foarte fragilă și trebuie să putem aplica cel mai bun tip de terapie pentru fiecare pacient.

Cuvinte cheie: limbaj, afazie, recuperare

INTRODUCTION

*“There are only two ways to live your life. One is as though nothing is a miracle. The other is though everything is a miracle.”
Albert Einstein*

Language helps us express ourselves. We use it to describe our thoughts, our feelings, desires, and dreams. Without it, we are unable to connect directly with people around us or far away. We live in era of

speed. Information is all around us. We need symbols to communicate. We need language, verbal or non-verbal. As a consequence of cerebral traumas, we can lose this capacity.

Aphasia is an inability to comprehend or formulate language, because of damage to specific brain regions (typically caused by a cerebral vascular accident- stroke, or head trauma). Aphasia is a disturbance of the comprehensive and formulation of

language caused by dysfunction in specific brain regions [1].

Patients with aphasia aren't capable anymore to use the language as a symbol for naming objects and thoughts.

Types of aphasia:

- A. Broca Aphasia (expressive aphasia): telegraphic speech, single words, the understand the verbal speech but can't express theirs;
- B. Wernicke Aphasia (receptive aphasia, fluent aphasia): they use words (without sense), nonexistent or irrelevant words;
- C. Global Aphasia: patients with global aphasia lose their capacity of speaking and reading. This is the most severe form of aphasia.
- D. Amnesic Aphasia (Anomic): partial or total loss of the ability to recall the names of persons or things.

Other forms of Aphasia:

- Conduction aphasia
- Transcortical aphasia (motor, sensory, mixed)
- Pure aphasia (pure anarthria, pure agraphia, pure verbal deafness, pure alexia-agnostic alexia)

Particular forms: child aphasia, aphasia in left-handers, polyglot aphasia, deaf aphasia.

Causes: brain damage resulting from a stroke, head injury, infections, brain diseases, dementia [2]. The brain has the capacity to create new interneuronal connections-cerebral plasticity [3].

Aphasia treatment is individualized. The patient with aphasia needs support from family, friends, medical staff. The therapist need to use: - Short sentences; Short questions; Objects easy to recognize; Photos, drawings, to help the patient describe if capable [4, 5].

We have to see if they can name, point, read, if he or she is time-space oriented and we need to speak clear to them. Our purpose is to improve their speech control,

oral skills, naming skills, improve their disposition.

The impact of the technology nowadays is unbelievable. Through it we can find information, we can communicate with people, we can express ourself. It is great to see that we can help people, patients can do activities, and therefore we encourage it. It is also important to keep contact with nature, walking and playing in fresh air.

There exist applications for the patients with aphasia, which help them communicate their needs. The National Aphasia Association made a platform for people with aphasia, free application compatible with Apple, Android and Kindle and it's called Lingraphica.

In Romania, unfortunately, there is no such application in our language, so it is good for the people with aphasia and their families to learn or to practice their English skills.

This application uses simple things, images, and associations of things, exercises and sounds in order to stimulate the person who uses it. It is practical and easy to use, giving them the opportunity to express themselves in a proper way and reeducate their language.

Case study: Male 66 years old; married with 3 children and 1 nephew; urban environment, very active socially, many friends, loved to travel with his wife

He used to read a lot; helped his wife with the household and grocery shopping. They live in a beautiful neighborhood, with a lake near. He used to wake up every morning at 5 a.m. for running, his favorite activity.

One night, three months ago, he woke up with a severe headache. His wife called the ambulance and he was hospitalized. The doctor recommended daily exercise and practice, but he wasn't that into it. He refused any contact and started to prefer to stay alone in the room.

When they first came at my office, his wife described how a usual day before his stroke was. He came back home after the

running, put music on their music system, so that the music could be heard in every room, made breakfast for them and then they start the day. His wife can't understand why such a healthy man could go through something like this. I asked him if he can point me the date in calendar. He did, a good start, he was orientated and as long he gave me any sort of answer, we had contact! After I got all the infos I needed, I chose to end the session there, before the patient gets tired and in some cases angry.

We established the second session, the next day, same hour. He waved goodbye. When they came back, he smiled. I put music in the office. He took his wife by the hand and tried to mime a dance! Good start! She was happy of his reaction and so was I. We started with simple things: point colors; action drawings; numbers from table.

He seems capable and open to our activities. I chose the appointments to last an hour, every second day, in the morning. He was impatient and I found him and his wife 15 minutes before the time, in front of the office. I put music in the background every session with them. (It is important to rely on the things, activities that used to make them happy). He was enrolled with technology, had a good knowledge in computer and internet so I approached things therefore. We found on the application store an application for people with aphasia, so he could practice on his phone and computer, in spare time [6]. He seems happy that he could practice at home too. His emotional status was changing, he started to smile often. The disposition is very important!

We practiced:

- Jaw mobility: (open/shut the mouth; teeth close/ far; move the mouth right/left).
- Lips and cheeks exercises: (open mouth, easy, for O U then a big A; show your teeth, strength your lips; alternate your moving for strength your lips then make a O; your upper lip over the down lip and viceversa; bite your lip, up/down; breath in.

- Tongue exercise: (show your tongue outside/inside; move your tongue up/down; touch your cheek with your tongue).
- Vocal therapy: (insist on nose pronunciation of N, M, MG, HAM, HUM, F, V
A, E, I, O, U
GA, GE, GI, GO, GU,
FA, FE, FI, FO, FU
- Push your cheek with your tongue right/left.
- Touch your lip with your tongue up/down.
- Wipe your teeth with your tongue [7-8].

The purpose of therapy is to make the patient more confident in him, retake his old habits. Every patient is different; we don't give "healing time". Chewing therapy is used to relax laryngeal and jaw muscles. Insist on imitation of chewing and if he is capable to imitate it, we go for pronouncing HUM IUM IAM-IAM. This patient was amused by the exercise, good feedback!

There can be situations when the patient is aggressive or feels the exercise is childish, but we explain him/her that it is really important to take it step by step. If he feels underestimated, we explain them that their disposition is important in his/her recovery process. The patient has to be hydrated, fed, and rested before the meetings. The family has to support them, be fully aware that this is important for the recovery process. They need support as well. We explain them that there is no time given for the process and they shouldn't put pressure on them. When the patient is released from INGG "Ana Aslan", I give him/her several papers with exercises that we made together. This patient was a good patient, he was determined, even if at the beginning he was skeptical. Between our meetings he exercised with his phone and his wife. There can exists patients, who don't want to exercise, but you can try convince them by explaining them the benefits of therapy by showing them examples. They have to be aware of their capacity. This patient succeeded to express simple words such as: YES/NO; PA/PA

(BYE BYE); IO (I), TA-TU (YOU), after two weeks of therapy.

CONCLUSION

It is important that the evaluation and the condition of the patient, to be made as

soon as possible after the stroke. The chance and flexibility is bigger, the disposition is very fragile, and so we need to be able to apply the best type of therapy for each patient.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- [1] Damasio AR. *Aphasia*. N Engl J Med 1992, 326:531-539.
- [2] Baldassarre A, Metcalf NV, Shulman GL, et al. *Brain networks' functional connectivity separates aphasic deficits in stroke*. Neurology 2019, 92(2):e125-e135.
- [3] Mesulam MM, Rader BM, Sridhar J, et al. *Word comprehension in temporal cortex and Wernicke area. A PPA perspective*. Neurology 2019, 92(3):e224-e233.
- [4] Motet D. *Aphasia and motor deficit*. Signs Editure 2012, 35-55.
- [5] Dulamea A. *Aphasia. Diagnose and recovery*. University Editure 2011, 150-273.
- [6] Cordella C, Quimby M, Touroutoglou A, et al. *Quantification of motor speech impairment and its anatomic basis in primary progressive aphasia*. Neurology April 2019, DOI: <https://doi.org/10.1212/WNL.0000000000007367>
- [7] <https://www.aphasia.org/aphasia-resources/aphasia-apps/>
- [8] <https://www.aphasia.org/aphasia-resources/aphasia-therapy-guide/>

UNDERSTANDING THE NEEDS OF OLDER PEOPLE IN RELATION WITH vINCI TECHNOLOGY

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Abstract. The older population needs are diverse and complex due to growing health conditions in the advanced age. With the extension of life span and growing of elderly population, it is very important to understand the factors that affect the quality of life (QoL) in this population group. Analysis of the multidimensional profiles of mental well-being includes psycho-social well-being. It should be recognized that general well-being phenomena including social aspects (e.g., social support, professional activity, interpersonal relationships), and health-related phenomena (e.g., functionality) are encompassed in QoL. In order to be able to achieve a good quality of life and an active aging, one needs to find ways of preventing illnesses together with deficits that overlap with the aging phenomenon. Moreover is a need to find methods of maintaining an older person in optimal aging settings. Technology has an enormous potential to benefit the lives of older persons, enabling them to live independently and providing the support to implement and promote preventive health care and health education. The vINCI technology could offer a feasible opportunity for seniors to independently evaluate their quality of life and health status. In the same time it sends out direct feedback to help older people in taking appropriate measures to improve their health status and prevent future negative events.

Keywords: quality of life, technology, older people, optimal aging

ÎNȚELEGEREA NEVOILOR PERSOANELOR VÂRSTNICE ÎN RELAȚIA CU TEHNOLOGIA vINCI

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Rezumat. Nevoile populației vârstnice sunt diverse și complexe conform condițiilor din ultimii ani legate de sănătate. O dată cu creșterea speranței de viață și a populației vârstnice, este foarte important să înțelegem factorii care afectează calitatea vieții acestora. Analiza profilurilor multidimensionale a stării de bine include starea de bine psiho-socială. Ar fi de recunoscut faptul că fenomene generale de bunăstare incluzând aspecte sociale (ex. suport social, activitate profesională, relații interpersonale) și fenomene legate de sănătate (ex. funcționalitate) sunt cuprinse în calitatea vieții. Pentru a putea atinge o bună calitate a vieții și o îmbătrânire activă, este nevoie să se găsească modalități de prevenire a bolilor împreună cu deficite care se suprapun fenomenului de îmbătrânire. Mai mult, este nevoie să se găsească metode de menținere a persoanei vârstnice într-un cadru de îmbătrânire optimă. Tehnologia are un potențial enorm în a aduce beneficii vieții persoanelor vârstnice, permițându-le să trăiască independent și oferindu-le sprijin în implementarea și promovarea îngrijirii medicale preventive și a educației pentru sănătate. Tehnologia vINCI poate oferi o oportunitate realizabilă pentru seniori pentru a-și evalua independent calitatea vieții și starea de sănătate. În același timp trimite feedback în urma căruia persoana vârstnică își ia măsurile adecvate pentru a-și îmbunătăți starea de bine și pentru a preveni viitoarele evenimente negative.

Cuvinte cheie: calitatea vieții, tehnologie, persoane vârstnice, îmbătrânire optimă

INTRODUCTION

The older population needs are diverse and complex due to growing health conditions

in advanced years. In order to understand the needs of older people, we need to have a critical analysis of medical, social and

psychological factors that appears in older people's life. Analysis of the multidimensional profiles of mental well-being includes emotional, psychological, and social well-being. It should be recognized that general well-being phenomena (satisfactions), social phenomena (e.g., social support, work, interpersonal relationships), and health-related phenomena (e.g., functionality) are encompassed in QoL [1].

It is important to mention that the needs are different depending on older people dependency level in terms of functionality. These levels of dependency can be established by pointing the criteria from The National Grid of Assessing the needs of older people. There are three levels of dependency: independent, semi-dependent and dependent [2].

Based on Maslow's Hierarchy of Needs, we all have the same needs: physiological (air, food, water, sex, sleep, homeostasis, excretion), safety (security of body, of resources, of morality, of the family, of health, of property), belonging (friendship, family, sexual intimacy), esteem (self-esteem, confidence, achievements, respect of others, respect by others), self-actualization (morality, creativity, spontaneity, problem solving, lack of prejudice, acceptance of facts) [3].

An independent older person can sustain most of these needs, unless it doesn't appear something to make changes in one of those domains like a serious health problem, a loss of a close person or anything else.

When it appears the inability of taking care of himself, the status of the older person changes into a dependent person [2], so are the needs. This person must have a permanent caregiver to feed him, wash him, dress him up and help him to move around. Some important issues that occurs at this stage of the person are disorientation which can lead to losing himself and frequent falls [4].

Life expectancy

The latest data presented by the National Institute of Statistics shows that the life expectancy for the Romanian population is increasing slightly. The year 2008 had a life expectancy of 73.5 years, and in 2017 the life expectancy reached 75.3 years [5]. It is important, however, to make a difference between life expectancy at birth and healthy life expectancy. If in 2014 life expectancy at birth was 75 years, the healthy life expectancy was only 59 years old [6].

According to estimates, life expectancy could reach 100 years for the next generations, because notable discoveries have been made, that could contribute to this growth, such as: medicine development, the use of technology, facilitating access to the online, and so on. Because these changes have occurred in terms of modernization and urbanization, there have also been differences in the shaping of the family pattern. If in the past we were talking about a large family that offered its members safety and stability, today is discussed more about family member's independence, but safety and stability are lost. Older people are most affected, the consequences being isolation, abandon or institutionalization.

The European Commission report named „Population ageing in Europe, Facts, implications and policies” highlight the fact that „Europeans live longer and healthier” and „longevity is one of the greatest achievements of modern society” [7].

Quality of life

Quality of life in older people can be measured from a bio-psycho-social point of view.

A better quality of life, an improvement in living conditions, especially at the level of specific health services offered to people over 65, would lead to an increase in healthy life expectancy [8].

This concept can be measured with a self-administration questionnaire of quality of

life, because it is very important to see how elderly evaluate their quality of life. One of the most used questionnaires is the WHOQOL-BREF, from World Health Organization. This questionnaire covers all physiological, psychological, social domains and even the elderly environment [9].

The aging process can not be stopped, but an active aging is recommended. The concept of active aging is the process in which older people are encouraged to remain active even professionally, to be actively and voluntarily involved in various cultural and community activities and to actively contribute to the development of the society they live in. All of these things lead to the independence of the older person and to maintain a healthy and fulfilled life.

It is important that the society to participate in creating the conditions for these people to have an autonomous life by adapting living conditions, the access to information, the transport, etc. [10].

Optimal Aging Concept

Because the world's population longevity has grown and we can see a dramatically progress in medical sciences, [11] it is very important to see the difference between old negative archetype as a decline in all area of life and the concepts such as "successful aging" and the newest concept "optimal aging" [12].

All of us have in mind the vision of an active and independent older person, so the term of optimal aging is very attractive. It is more realistic this concept that "successful aging" because here we talk more about growing old but still be resilient in front of changes of life.

Because many persons over 65 years old have at least a chronic disease, and sometimes functional deficits, many authors have questioned if those people have an unsuccessful aging. Kenneth Brummel Smith said in a paper that "the opposite of success is failure". So, he asked himself "is frailty the ultimate

failure?" [13]. Therefore, if successful aging is viewed more like a life without disease and disability we can recommend more the optimal aging model. It is more difficult to have a life without diseases and disfunctions, rather than learn how to function despite of medical conditions.

The importance of technology

In order to be able to aging active, we need to find ways of preventing illnesses and other deficits which overlap with the aging phenomenon and we need to find the method of keeping an elderly person in an optimal aging setting.

Technology has an enormous potential to benefit the lives of elderly, enabling them to live independently and providing the support to implement and promote preventive health care and health education. There is a technology that covers all these problems by using a smartwatch, wearable by the elderly and monitored by the caregiver. This technology meets the needs of both independent and dependent people. It is called vINCI technology and it could offer a feasible opportunity for seniors to independently evaluate their quality of life and health status. In the same time it sends out direct feedback to help older people to take appropriate measures to improve their health status and prevent future negative events [14].

vINCI Technology

vINCI technology has been created in order to contribute to increase the level of active aging and the quality of life for the elderly, both with or without cognitive impairments.

vINCI technology consists in a platform with multiple inputs: a static profile of the subject; the results of a Quality of Life Questionnaire of the monitored elderly; the data provided by the monitoring devices that are used (smart shoes, depth camera, smart watch), as well as the data on the level of activity and the psycho-social level of the monitored older people, data

gathered following the application of questionnaires.

To this platform can have access the caregiver, the doctor or the clinic that is monitoring the patient.

Smart shoes were created to be able to monitor, with the help of sensors installed in it, the various conditions and activities of the monitored person: sitting, walking, running or if the shoes are not used.

Depth camera is used to recognize and to track the subject by processing the frames generated by the sensor. This monitoring involves a top-view configuration in which the sensor is physically located on the ceiling. In such a configuration we can detect how much time the subject spends in a certain area, such as how long he spent standing on the couch.

Smart watch allows locating the subject through the GPS, count the steps that the subject made, monitor how often the watch has gone out of the defined area or the time intervals in which the watch has been removed from his/her hand. Another important component is the application for the owners, called *vINCI Digital Caregiver Application*. All data provided to the VINCI platform is sent using cryptographic solution for personal data

protection. Also, wearing the smart watch, intelligent shoes, installing a depth camera to monitor the older person and collecting personal data, is done on the basis of an informed consent that is signed by the subject.

The use of this technology provides spoken feedback at the end of the day on the daily activity; it will be a positive feedback if the activity was enough, or it will be a negative feedback if devices registered insufficient activity. The technology also provides a reminder for the next day to have in mind that there should be some changes in daily routine in order to be more active. If the subject needs a medical visit, the technology will provide specific recommendations depending on the registered data [14].

Conclusions

The vINCI technology responds to the needs of older person and it could be a good way to be in touch with all that happened with the patient, if we talk from the doctor's perspective, or with the one that you carry out, if the monitoring is made by the caregiver.

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Conflicts of interest

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REFERENCES

- [1] Bergman H, Karunanathan S, Robledo LMG, Brodsky J, Chan P, Cheung M, Bovet P. *Understanding and Meeting the Needs of the Older Population: A Global Challenge*. Can Geriatr J 2013; 16(2): 61–65. Published online 2013 Jun 3. doi: 10.5770/cgj.16.60
- [2] The National Grid of Assessing the elderly needs
http://www.mmuncii.ro/j33/images/Documente/Legislatie/Assistentia-sociala-2018/HG_886_2000_la_18-01-2018.pdf
- [3] Saul McLeod. *Maslow's Hierarchy of Needs*. updated online 2018.
<https://www.simplypsychology.org/maslow.html>
- [4] Laurence Z. Rubenstein. *Falls in the Elderly*. University of Oklahoma College of Medicine, october 2016,
<https://www.msmanuals.com/professional/geriatrics/falls-in-the-elderly/falls-in-the-elderly>
- [5] Eurostat, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_mlexpec&lang=en

- [6] Institutul National de Statistica, Bucuresti
http://www.insse.ro/cms/sites/default/files/field/publicatii/speranta_de_viata_sanatoasa.pdf
- [7] European Commission, “*Population ageing in Europe, Facts, implications and policies*”, 2014 ,
https://ec.europa.eu/research/social-sciences/pdf/policy_reviews/kina26426enc.pdf
- [8] Mária Sovárióvá Soósová. *Determinants of quality of life in the elderly*.
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<http://creativecommons.org/licenses/by/4.0/>.
- [9] WHOQOL – BREF, https://www.who.int/mental_health/media/en/76.pdf
- [10] Foster L and Walker A. *Active and Successful Aging: A European Policy Perspective*, Gerontologist. 2015 Feb; 55(1): 83–90. Published online 2014 May 20. doi: 10.1093/geront/gnu028
- [11] Institutul National de Statistica
http://www.insse.ro/cms/sites/default/files/field/publicatii/proiectarea_populatiei_varstnice_in_profil_teritorial_la_orizontul_anului_2060.pdf
- [12] Rowe JW, Kahn RL. *Successful Aging*. Gerontologist 1997; 37: 433-440.
- [13] Brummel- Smith K. *Optimal Aging, Part I: Demographics and Definitions*. Annals of Long-Term Cre, 2007, 15, 11, 26-28.
- [14] <https://vinci.ici.ro>

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CUVINTELE CHEIE. În partea de jos a fiecărei versiuni a rezumatului se vor include 3 până la 5 cuvinte cheie.

SECȚIUNILE. Manuscrisele care prezintă rezultatele unor studii originale trebuie să conțină maxim 2500 de cuvinte și să fie organizate în următoarele secțiuni: Introducere, în care vor fi specificate clar obiectivele și ipotezele studiului; Materiale și Metode; Rezultate; Discuții; Concluzii. În secțiunea "Rezultate" vor fi incluse tabelele, graficele și figurile împreună cu titlurile și legendele lor.

BIBLIOGRAFIA. Bibliografia va cuprinde maxim 30 de titluri reprezentând articole publicate recent (în ultimii 10 ani). Se acceptă articole mai vechi dacă prezintă importanță deosebită în domeniul respectiv. Titlurile bibliografice se vor ordona în funcție de apariția în text. La fiecare lucrare vor fi menționați doar primii trei autori urmați de *et al.* Citarea articolelor se face după următorul model:

Pentru articole din revistele științifice: Shapiro A.M.J., Lakey J.R.T., Ryan E.A., et al. *Islet transplantation in seven patients with type 1 diabetes mellitus using a glucocorticoid-free immunosuppressive regimen*. N. Engl. J. Med., 2000, vol. 343, 4: 230-238.

Pentru articole în format electronic: Niki E. *Role of vitamin E as a lipid-soluble peroxyl radical scavenger: in vitro and in vivo evidence*, Free Radical Biology and Medicine, 2014, 66: 3–12. <http://dx.doi.org/10.1016/j.freeradbiomed.2013.03.022>3557727.

Pentru capitol sau subcapitole din monografii sau tratate: Goadsby P. J. *Pathophysiology of headache*. In: S. D. Silberstein, R.B. Lipton and D. J. Dalessio (Eds.), *Wolff's headache and other head pain*, 7th ed. 2001, Oxford, England: Oxford University Press, pp. 57-72.

Pentru articole prezentate la conferințe: Brown S. & Caste V. *Integrated obstacle detection framework*. Paper presented at the IEEE Intelligent Vehicles Symposium, May 2004, Detroit, MI.

Pentru articole prezentate la conferințe care apar online: Balakrishnan R. *Why aren't we using 3d user interfaces, and will we ever?* Paper presented at the IEEE Symposium on 3D User Interfaces March 25-26, 2006. doi:10.1109/VR.2006.148

FIGURILE. Figurile vor fi realizate profesional. Titlul va fi scris sub figura, format Times New Roman 10, iar pentru numerotare se vor utiliza cifre arabe. Fișierele cu imagini trebuie să fie în format JPG sau TIF iar rezoluția trebuie să fie de 300 dpi.

Dacă sunt incluse imagini ale unor pacienți, este necesar consimțământul scris al pacientului pentru difuzare publică sau pacientul trebuie să fie neidentificabil.

TABELELE. Titlul fiecărui tabel va fi scris deasupra, iar pentru numerotare se vor folosi cifre romane, format Times New Roman 10. Notele explicative vor fi în partea de jos a tabelului. Nu se accepta repetarea rezultatelor din tabel prin grafice.

EXPRIMAREA MULȚUMIRILOR. Vor fi menționate înaintea bibliografiei, utilizând maximum 30 cuvinte. Se pot exprima mulțumiri pentru sprijinul acordat în desfășurarea proiectelor de cercetare.

ABREVIERILE. La prima utilizare în text, abrevierea (acronimul) trebuie să fie precedată de expresia integrală.

DENUMIREA MEDICAMENTULUI. Se utilizează numele generic al medicamentului. Atunci când marca de proprietate a fost utilizată în articolul de cercetare, aceasta se scrie în paranteze și apare în secțiunea "Materiale și Metode" a manuscrisului.

UNITĂȚILE DE MĂSURĂ. Înălțimea, greutatea, volumul, lungimea vor fi exprimate în unități de măsură din sistemul internațional (centimetru, kilogram, litru, unități decimale ale litrului, metrului). Temperaturile vor fi specificate în grade Celsius. Presiunea arterială va fi precizată în mmHg. Rezultatele analizelor laboratorului clinic vor fi exprimate în unitățile de măsură din sistemul internațional SIU.

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