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Changes in personality and depression in older adults with Alzheimer's disease

Cambios en la personalidad y depresión en adultos mayores con enfermedad de Alzheimer

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Abstract: The literature refers that personality change begins in the premorbid phase of mild neurocognitive disorder (TNC) and that depression can increase these changes, on the other hand, depression is treatable and as such its influence on personality is reversible. In this sense it is urgent to understand what the effective influence of depression in the TNC is, in patients with Alzheimer's. Objective: Explore level of depression and changes in personality in elderly with TNC due to Alzheimer's disease. Methodology: A total of 437 older adults participated. Participants were evaluated through the application of a Personality Inventory NEO-FFI; Mini-Mental State Examination (MMSE), and the Beck Depression Inventory (BDI-II). Results: There was an increase in behavioural changes due to the influence of the responsibility trait, associated with the increase in cognitive symptoms, both due to the influence of depression.

Keywords: mild cognitive impairment, neurocognitive disorder, personality, cognition, elderly, depression, Alzheimer's disease

Resumen: Objetivo: Explorar nivel de depresión y cambios en la personalidad en pacientes adultos mayores con trastorno neurocognitivo leve (TNC) debido a Enfermedad de Alzheimer. Introducción: La literatura refiere que el cambio de personalidad se inicia en la fase premórbida del TNC y que la depresión puede incrementar esos cambios, por otro lado, la depresión es tratable y como tal su influencia en la personalidad es reversible. En este sentido urge entender cuál es la influencia efectiva de la depresión en el TNC, en pacientes con Alzheimer. Metodología: Participaron 437 adultos mayores. Evaluados a través de la aplicación del Inventario de Personalidad NEO-FFI; Examen del Estado Mental (MME), y el Inventario de Depresión de Beck (BDI- II). Resultados: Se verificó un incremento de cambios comportamentales por influencia del rasgo de responsabilidad, asociado al aumento de la sintomatología cognitiva, ambos por influencia de la depresión.

Palabras clave: deterioro cognitivo leve, trastorno neurocognitivo, personalidad, cognición, adulto mayor, depresión, enfermedad de Alzheimer

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The previous works in this line of investigation has demostrated that the changes in personality traits in older adults with mild neurocognitive disorder (MND) exists, although is difficult to systematize a pattern of changes (Riddle et al., 2017; Rodrigues, Castro, & Figueiredo, 2014). The personality has two important intrinsic factors that are based on its own constitution: temperament and character. The temperament is associated with the genetic dotation, in this sense it influences and is influenced by the experiences of each person. Instead, the character has a relation with a combination of feelings and behaviors, which is considered an important aspect, whose nature is individual, cultural and social (Cloninger, Przybeck, Svrakic, & Wetzel, 1994; Da Silva, 2017).

The literature refers that the change starts in the premorbid stage of the neurocognitive disorder and is related with the reduction of the liability, considering the 5 dimensions of the theory The Big Five Factors (Costa, Terracciano, & McCrae, 2001; Costa & Widiger, 2002). The personality traits seem to fit to a pattern of decrease in responsibility, in premorbid stage, that is to say, before the diagnostic. Apparently, the cognitive changes are associated to the same responsibility for alterations at the level of spatial orientation and capacities vision constructive, and to the kindness for alterations in immediately memory and attention (Da Silva, Carvalho, González, & Quino, 2018; Pocnet, Rossier, Antonietti, & Gunten, 2013; Rodrigues, Castro, & Gruart, 2014b; Vidovich & Almeida, 2011).

Other researchers have been oriented to the neurocognitive disorder with moderate cognitive impairment, and it has been verified, that after the mild cognitive impairment, the changes in personality traits increase, with an even more marked disease of responsibility, and changes at neuroticism level and of the opening (Da Silva, Carvalho, Quino, & Gruart, 2017). Such research, linked the worsening of the behavioral pattern, with the changes of the memory and attention mechanisms. Considering that this relation can be the basis for the understanding of neuropsychiatric changes that at the same time have a relation with the behavioral changes associated to the brain degeneration (Pérez-Fuentes, Gázquez, & Morelo, 2012; Ramakers & Verhey, 2017; Rodrigues, Castro, & Cruz Roja Española, 2014).

In previous investigations we could verify that the relation between personality traits and the cognitive impairment are based on an association of immediate memory in more than 6% of neuroticism and more than 3% of the kindness; meanwhile, the attention is associated in more than 3% also, with the neuroticism (Da Silva, Ramos, & Carvalho, 2018; Rodrigues, 2015). Although the relationship is not clear about its cause effect, considering that it could also justified the changes in neuroticism to cognitive alterations in memory and attention. Finally, both increases of impairment are related: personality traits and alterations at the level of cognitive mechanisms (Qazi, Gutzmann, & Gul, 2017).

The analysis of the findings of these previous investigations through the theoretical concepts of The Big Five Factor, which represents behavioral changes, in the premorbid phase of the elderly, with a tendency to fail to plan for the future, loss of interest in novel things and inclusive, for those matters which were their favorite. While, in the DCL, the premorbid changes increase and a tendency arises to experience distress and anxiety, along with difficulties in managing stress and impulse control. To these personality changes are added the memory and attention alterations, and other cognitive mechanisms in case of associated depression (Da Silva & Carvalho, 2017a; Ramakers & Verhey, 2017; Rodrigues, Castro, & Gruart, 2014a).

Alterations in the cognitive mechanisms of orientation; attention and calculation; language; memory; and delayed memory and viso-constructive ability of older adults with Alzheimer at early stage, may experience more symptomatology intense of neurodegenerative picture when it is associated with depression (Da Silva & Carvalho, 2017b). The depression, in general, and as it is considered in this investigation, founds in the elderly when he begin to gain consciousness and to have perception of Alzheimer diseases and its consequences. Thus, previous research reports that both mild and moderate type depression generate alterations at the cognitive processes level (Qazi, Gutzmann, & Gul, 2017).

In this sense it seem fundamental to know about the ethology of the depressive state so the evaluation can be precise and thus, provide to the elderly or their carer a differential diagnostic. A good diagnostic gives the possibility to the professional in health a better adaptation of the cognitive stimulation program, to be consisted

with the neurodegenerative picture, without considering the intensification of the symptoms caused by depression, and considering that depression is being treated. The depression, can be treated, and as such, make reversible the increased in cognitive alterations of the elderly and consequently of the behavioural changes (Da Silva, Ramos, & Carvalho, 2018; Leyhe et al., 2017).

Is necessary to add that each elderly has a particular aging that cannot be generalized or compared with another elderly, situation that is more complicated when the aging is accompanied by Alzheimer's disease (Riddle et al., 2017). The most significant thing is that as we get older, the comorbidity with more frequency is depression; although the geriatric depression may be associated with other comorbidities, like diseases that are presented as a matter of age. Finally, the sociocultural criteria, economics and the family support will be fundamental, mainly at the intervention moment (Da Silva, Ramos, & Carvalho, 2018).

Thus, this work aimed to explore the depression level and the changes in the personality in elderly patients with mild neurocognitive disorder due to Alzheimer's disease.

Method

Participants

The sample was of 437 older residents in Guanajuato, Mexico, with 239 women (54.6%) and 198 men (45.4%). The average age of the participants was 87 years and they were divided homogeneously in two groups: an experimental group (GE) and a control group (CG).

The GE of 210 older adults with early Alzheimer's stage, DCL, and depression randomly chosen through the National Institute of the Elderly in the State of Guanajuato. The GE had an average age of 86 years that varied between 74 and 98 years, its division by gender was represented by 120 women (57.1%) and 90 men (42.9%).

The GC was constituted by 227 older adults in a normal aging phase and without depression, randomly chosen through by the National Institute of the Elderly of the State of Guanajuato. The GC had an average age of 88 years that varied between 78 and 97 years, its division by gender

was represented by 119 women (52.4%) and 108 men (47.6%).

As inclusion criteria, for the GE the participants had to present a clinical diagnosis of Alzheimer supported by a neurologist and a clinical diagnosis of depression supported by a psychiatrist. The diagnosis of depression should be after Alzheimer's, assuring that the hypothesis of the depression is due to the conscience of the disease. For GC the only criterion of inclusion that had to present was that they were not suffering from any type of chronic disease, cognitive or depression, clinically supported by the family doctor. All the participants had to be 70 years or older to participate in the investigation.

Instruments

To evaluate the depression level, it was used the Beck's Depression Inventory (BDI- II) created in 1996. It is one of the most widely used tests worldwide for clinical and research population, considering that it appears in many studies and because it has good levels of validity and reliability, allowing the comparison with other studies. It consists of 21 reagents formulated with the verbal descriptions that generally the clinical depressive population provides on his symptomatology. The inventory is of type Likert, with four points, where "0" is "not", and 3 is " yes, very much ". Its application is short, about 15 minutes, in addition it can be self-applied (Beck, Steer, & Brown, 1996; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961).

Mini Mental Examination (MME) by Folstein. The MME is a clinical instrument of individual application, with an approximate duration of 15 minutes, which is used for the therapeutic assessment of cognitive functions of patients, as well as to verify the cognitive levels and to trace dementias. The MME is divided in 5 categories of evaluation; orientation; memory; attention and calculation; language; differed memories and viso-constructive capacity. The raw score may need corrections according to the schooling and age of the user (Folstein, Folstein, & McHugh, 1975).

To carry out the personality evaluation the NEO-FFI personality inventory was used, in its reduced version of 60 items and 5 dimensions or traits: neuroticism, extroversion, openness to experience, kindness and responsibility.

The validation of the inventory presents a level of homogeneity of 0.22 to 0.45 and an internal consistency of .70 to .71, while the alpha coefficient of Cronbach (α) indicates a reliability of .73 for the neuroticism trait, of .78 for extroversion, of .79 for openness experience, of .70 for kindness and of .74 for responsibility (Costa, Terracciano, & McCrae, 2001; Costa & Widiger, 2002).

Procedure

Conditions and objectives were explained to participants and caregivers, while the consents were obtained and a clinical history was processed, all within the scope of the INAPAM and according to APA criteria and those of the General Law of health of Mexico. The administration was carried out in 4 sessions, the last one destined to report on the results.

The analysis of the results was carried out in Statistical Package for the Social Sciences (SPSS) program in its version number 22 for the Windows 7 system. The statistical tests used were the Spearman correlation coefficient with 95% of confidence, in turn to contrast the differences between the different levels of depression and cognitive mechanisms, the nonparametric test of Kruskal Wallis was performed.

Results

The analysis of the relationship between both groups at the level of personality traits and cognitive mechanisms, compared to experimental

Table 1
Analysis on the relationship of personality and cognitive mechanisms range

	Cognitive Mechanisms	N	Average Range
Neuroticism level	Normal high	289	249.70
	Moderate	144	259.58
	Total	437	
Extraversion level	Normal high	79	254.64
	Moderate	24	243.31
	Total	437	
Opening level	Normal high	79	254.09
	Moderate	24	245.13
	Total	437	
Kindness level	Normal high	79	252.49
	Moderate	24	250.40
	Total	437	
Responsibility level	Normal high	79	248.99
	Moderate	24	261.92
	Total	437	

and control groups, can be verified in table 1. In each personality trait of the Big Five Factor, the level of the state of the cognitive mechanisms can be verified, considering the normal, high and moderate level.

A test was conducted to find differences between the products of cognitive processes and personality traits according to NEO-FFI, filtering those people who presented some type of depression measured by BDI-II, finding differences Statistically significant with the Kruskal Wallis Test between the trait of responsibility (p =.042) and a moderate level of deterioration (table 2).

As previously mentioned there are strong relations between cognition and depression, as well as between cognition and personality, in this sense it seemed fundamental to investigate the influence that depression may have on cognition, considering that the Experimental group presents DCL (table 3).

The results obtained by means of the coefficient of Spearman show that there is a statistically significant correlation between the level of cognitive processes and the level of depression, the greater cognitive impairment, higher levels of depression (r =.575, p =.000) when we compared GE to GC.

The analysis between the memory ranges and depression levels according to BDI-II and between GC and GE can be verified in table 4. For each cognitive process a study is carried out according to depression level (without depression, intermittent depression and moderate depression) (table 4).

To contrast differences between the levels of depression measured by the BDI-II; a Kruskal Wallis test was carried out. The results show the existence of statistically significant differences between the tasks of orientation (p=.00), attention and calculation (p=.000), language (p=.000), memory (p=.019), visual abilities constructive (p=.000) and deferred recall (p=.000).

In this sense, they scored with lower performance those people who have a moderate or intermittent depression in the tasks of orientation, attention and calculus, language, vision-constructive capacities and memory, except the tasks of capacities Vision-constructive, where people who do not have depression have lower scores than those presenting some type of depression measured by BDI-II (table 5).

Table 2
Test statistics Kruskal Wallis

	Neuroticism level	Extraversion level	Opening level	Kindness level	Responsibility level
Qui square test	2.522	3.050	2.034	.104	4.123
gl	1	1	1	1	1
Asymptotic Sig	.112	.081	.154	.747	.042

a. Test of Kruskal Wallis
b. Group Variable: mental status.

Table 3
Correlations cognitive mechanisms with depression level

			Cognitive Mechanisms
Rho of Spearman	Depression level	Correlation coefficient	.559**
		Sig. (bilateral)	.000
		N	437

** The correlation is significant at the 0.01 level (bilateral).

Table 4
Analysis on the relationship of cognitive mechanisms and depression ranges

Cognition / Depression	Depression level	N	Average Range
Orientation	Without depression	273	119.88
	Intermittent	58	93.93
	Moderate	106	90.02
	Total	437	
Attention and calculation	Without depression	273	238.79
	Intermittent	58	66.00
	Moderate	106	173.10
	Total	437	
Memory	Without depression	273	216.26
	Intermittent	58	90.18
	Moderate	106	194.65
	Total	437	
Language	Without depression	273	237.89
	Intermittent	58	62.43
	Moderate	106	174.65
	Total	437	
Viso-constructive capacities	Without depression	273	230.13
	Intermittent	58	78.32
	Moderate	106	180.92
	Total	437	
Delayed Memory	Without depression	273	85.76
	Intermittent	58	229.29
	Moderate	106	222.85
	Total	437	

Table 5
Test statistic Kruskal Wallis

	Orientation	Attention and calculation	Memory	Language	Viso-constructive capacities	Delayed Memory
Qui square test	20.745	66.602	7.972	62.356	40.779	22.369
gl	2	2	2	2	2	2
Asymptotic Sig	.000	.000	.019	.000	.000	.000

a. Test of Kruskal Wallis
b. Group variable: depression level.

Discussion

As long as depression can be treated, it enables a readjustment in cognitive impairment. Many times in personality assessments this factor is not considered, being that the diagnosis ends up being more serious than it really should be. Previous research considers the influence of depression on cognitive changes, while still considering that a depression after the diagnosis of Alzheimer's will be fundamentally associated with the perception that the older adult has of the disease that have (Da Silva, 2017; Riddle et al., 2017; Rodrigues, Castro, & Figueiredo, 2014).

Thus, it was possible to verify a lower cognitive performance in older adults who showed a moderate or intermittent level of depression. The increase of the limitations is verified in orientation, attention and calculus, language, vision-constructive capacities and memory, being that only the cognitive mechanisms of viso-constructive capacities, where the people who do not have depression have lower scores than those with some type of depression measured by the BDI-II (Da Silva, Ramos, & Carvalho, 2018; Leyhe et al., 2017).

While the previous data did not refer alterations in the attention and memory, in this study it is verified in addition to these, alterations in the language, considering that the orientation and the attention are interdependent cognitive mechanisms (Leyhe et al., 2017). It is equally important to refer that the previous data were collected in European countries, which by sociocultural issues could shed some differences associated with the cultural factor (Riddle et al., 2017).

Regarding the personality, it was verified that, when there is moderate depression, a statistically significant difference is verified in the liability trait. This trait is related to the ability to plan the future, being that its alteration causes limitations in the capacity that the older adult can present for the change of focus of the subject as desired and in the ability to suppress inadequate responses. In addition, it can be investigated that the elderly with this type of alteration have less longevity, because of their less motivation to engage in behaviors that promote health (Costa, Terracciano, & McCrae, 2001; Costa & Widiger, 2002).

This trait is even more affected, due to cognitive alterations, fundamentally with changes in attention that evade the ability to select the most important stimuli in the environment; In language than by limiting the communication of older adults to caregivers and health professionals; and memory, away from their normal pattern of behaviors, their motivations, their interests, and mainly, their concern for themselves, for others and their environment. All these alterations are amplified by the influence of depression, which affects personality traits, as well as cognitive processes (Da Silva, Ramos, & Carvalho, 2018; Costa & Widiger, 2002; Leyhe et al., 2017).

In this study it was possible to verify a significant change as regards personality traits in the elderly with mild TNC, although a pattern of changes could not be systematized. The responsibility trait decreases significantly, along with the DCL of the older adult. As the results indicate, it would be the cognitive processes responsible for the behavioural changes, considering that the decrease of values in the responsibility trait could be associated with changes in processes such as: orientation, attention and calculus, language, viso-cognitive capacities and memory (Da Silva, Ramos, & Carvalho, 2018; Leyhe et al., 2017).

The results obtained reveal a series of important functional alterations in the elderly, such as the inability to plan their future, to develop changes in thematic focus in a conversation or in the suppression of inappropriate responses. Although, the most important thing in this research is to verify that depression affects both personality and cognition, in this sense, for a good differential diagnosis of the elderly, it is essential to intervene on depression or consider its effects at the time of develop a diagnosis and a forecast and take care that these variables can have a direct influence on their behavioral limitations (Leyhe et al., 2017; Riddle et al., 2017).

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