

ORIGINAL ARTICLE

Multidimensional approach usefulness in early Alzheimer's disease: advances in clinical practice

Carlo Pruneti, Augusto Innocenti, Davide Maria Cammisuli

Laboratory of Clinical Psychology, Psychophysiology and Clinical Neuropsychology, Department of Medicine and Surgery, University of Parma, Parma, Italy

Summary. *Background and aim:* Improving quality of life of patients with early Alzheimer's Disease (AD) is a primary concern of health professionals involved in dementia treatment. The aim of this study is to reveal associations among psychiatric symptoms and wellbeing aspects, dysfunctional lifestyles and stress-related behaviors, illness perception, personality traits, and life quality satisfaction, in order to offer a comprehensive evaluation of psychological and behavioral aspects characterizing patients with early AD. *Methods:* This is a cross-sectional study in which all the outpatients included were evaluated at the Dementia Clinic in Parma (Italy). 21 patients with probable AD were assessed by an overall cognitive screening (Milan Overall Dementia Assessment), the evaluation of personal and instrumental autonomy (Activities of Daily Living and Instrumental Activities of Daily Living), and of dementia severity (Clinical Dementia Rating Scale). After the neurocognitive assessment, a wide battery of clinical and psychological measures (Symptom Questionnaire, Pisa Stress Questionnaire, Illness Behavior Questionnaire, Sixteen Personality Factor Questionnaire and Satisfaction Profile) was administered to the patients. Spearman's rho correlations between clinical and psychological measures were performed. *Results:* A tendency to deny anxiety, depressive and somatic symptoms might be present in patients with early AD. They also present with hypochondriasis, resulting in higher level of anxiety and depression. Reduced liveliness and self-reliance as personality traits may influence the intensity of such symptoms. *Conclusions:* A comprehensive assessment including psychological and clinical measures should be routinely integrated in clinical practice for the evaluation of patients with early AD. (www.actabiomedica.it)

Key words: Alzheimer's disease, multidimensional approach, dementia care, psychological distress, quality of life

Introduction

Alzheimer's Disease (AD) is a primary neurodegenerative disease of Central Nervous System characterized by an ill-fated clinical course. During the course of neurocognitive deterioration, a heterogeneous group of neuropsychiatric symptoms consisting of disturbed emotions, mood disorders and altered personality traits affect many aspects of patients' life (1). Neuropsychiatric symptoms or 'Behavioral and Psychological Symptoms of Dementia' (BPSD) (2) are very common

in AD patients and are associated with high levels of distress both in patients and their caregivers and poor Quality of Life (QoL) (3, 4). Several studies reported that neuropsychiatric symptoms are also common in patients with mild cognitive impairment, especially for anxiety, depression, apathy and irritability (1, 5).

However, behavioural and psychological manifestations may not completely refer to AD degeneration *per se* but represent difficulties of patients to adapt progressive disability effectively and to counteract frustration caused by the disease. In particular, anxiety disorder

der, depressive mood, reduced engagement in pleasant activity and reduced ability to perform activities of daily living have been recognized as remarkable factors influencing psychological distress and QoL in people with dementia (6).

According to some investigations (7, 8), patients in very early stages of AD are able and willing to report their experiences especially with cognitive decline (in particular, memory loss) and other aspects of the disease and are reliable about their own condition when they are offered a framework to help organize thoughts and feelings on the disease.

In the light of this assumption, we believe that a comprehensive evaluation of psychiatric symptoms and wellbeing aspects, dysfunctional lifestyles and stress-related behaviors, illness perception, personality traits, and life quality satisfaction may contribute to better understand the involution caused by the disease and to offer clinicians an in-depth analysis in order to plan treatment and address complex care needs of AD patients.

Methods

A total of 21 patients (M:F=13:8) with probable Alzheimer's Disease were diagnosed according to NINCDS-ADRDA criteria (9). After a complete clinical history, physical and neurological examination, neuroimaging and laboratory exams, the patients were tested by a neuropsychological battery, including:

- a global cognitive screening: Milan Overall Dementia Assessment (MODA) (10); a total global score below 85.5/100 indicates a dementia syndrome;
- the evaluation of personal and instrumental autonomy: Activity of Daily Living (ADL) (11) and Instrumental Activity of Daily Living (IADL) (12);
- the specific evaluation of the following cognitive domains:
 - a. memory and visuospatial functioning: Digit Span, Corsi Span, Memory of Prose, Corsi Suvra-span learning (13), and Rey-Osterrieth Complex Figure (Copy of the Rey Figure and 10-minute Delayed Recall) (14);

- b. attention system: Trail Making Test (TMT) (15) and Visual Search Test (13);
- c. language: Phonemic Fluency (13);
- d. logical reasoning: Colored Progressive Matrices (16).

AD patients were then evaluated by the following clinical and psychological measures:

- a. Symptom Questionnaire (SQ) (17): it was developed from the Symptom Rating Test (SRT) of Kellner and Sheffield (1973), with the aim of making the scales more sensitive for clinical research. The items of the SQ were derived from the original list of symptoms from which the SRT was built. The SQ is a self-reported measure based on four main scales: Anxiety (A); Depression (D); Anger/Hostility (AH); Somatic (S). It consists of 92 items of which 68 items indicate symptoms (symptom subscales: depressive symptoms -d-; anxiety symptoms, -a-; anger-hostility symptoms, -ah-; somatic symptoms -s-) and 24 items are antonyms of some of the symptoms and indicate well-being (well-being subscales: contented -c-; relaxed -r-; friendly -f-; somatic wellbeing -sw). The subject is given a rating of 1 for each symptom that is checked "yes" or "true" and for each statement of well-being that is checked "no" or "false". The more is the total score the higher is the psychological distress;
- b. Pisa Stress Questionnaire (PSQ) (18): it evaluates the presence of dysfunctional lifestyles and stress-related behaviors. The items indicate characteristic behaviors of individuals with high levels of stress, similar to some patterns distinctive of the Type A personality, such as hostility, competitiveness, ambition, urgency, difficulty in expressing feelings and emotions, disturbances related to stressful situations, and checking. The main questionnaire factors are six and described as follows: Sense of Responsibility (SR), Vigor (V), Stress-induced Disorders (SD), Precision and Punctuality (PP), Leisure (L), Hyperactivity (H). The questionnaire consists of 32 items, 16 of which provide a dichotomous answer

- ("yes"/"no"), 15 having three possible answers ("often"/"sometimes"/"never") and 1 that requires the subject to compare his/her behavior with that of people in general. Other than scores referring to these six factors, a total score is given, by summarizing the presence of dysfunctional/stress-related behaviors and psychopathological risk factors;
- c. Illness Behavior Questionnaire (IBQ) (19): it is a 62-item questionnaire that provides information about patient's attitudes, ideas, affects, and attributions in relation to illness that was originally developed as an expanded version of the 14-items Whiteley Index of Hypochondriasis of Pilowsky (1967). The IBQ evaluates the following seven scales: General Hypochondriasis (GH); Disease Conviction (DC); Psychological *versus* Somatic perception of illness (PS); Affective Inhibition (AI); Affective Disturbance (AD); Denial (D); Irritability (I). A "yes"/"no" response is required for each item. The total score is represented by the sum of positive items;
 - d. Sixteen Personality Factor Questionnaire - Form C (16PF-C) (20): it is a comprehensive measure of normal-range multi-level personality based on Cattell's factor-analytic theory. The form C reports 105 items and it allows to measure four second-order factors (i.e., Extraversion, Anxiety Neuroticism, Tough-Mindedness, Independence, Self-control) beyond first-order factors (i.e., Warmth -A-, Reasoning -B-, Emotional Stability -C-, Dominance -E-, Liveliness -F-, Rile-Consciousness -G-, Social Boldness -H-, Sensitivity -I-, Vigilance -L-, Abstractedness -M-, Privateness -N-, Apprehension -O-, Openness to Change -Q1-, Self-Reliance -Q2-, Perfectionism -Q3-, Tension -Q4). For each item it is assigned a point of 0, 1 or 2 except for factor B, and raw scores are converted into stanines;
 - e. Satisfaction Profile (SAT-P) (21): it is 32-item questionnaire able to evaluate five factors globally summarizing main aspects of adult life: Psychological Functioning (PsF), Physical Functioning (PF), Work (W), Sleep-Eating-Leisure (SEL), and Social Functioning (SF). The patient is required to indicate his/her satisfaction along a continuum by drawing a perpendicular line on a segment which endpoints are represented by "no satisfaction" and "full satisfaction". For each item the scoring is made by calculating the distance between the endpoint "no satisfaction" to the point indicated by patients in millimeters. For each factor the total score is given by the mean of correspondent items. The SAT-P total score ranges from 0-100. The test was previously used in patients with dementia syndromes (22).
- The neuropsychological testing and the psychological and clinical evaluation took approximately four sessions of 90 minutes to be administered to each patient by trained practitioners of the Clinic. Specifically, the sessions were made in alternate days to reduce fatigue and in relation to the cognitive and emotional tasks load. They encompassed in order:
- the global cognitive screening and the evaluation of personal and instrumental autonomy (first session);
 - the specific evaluation of cognitive domains (second session);
 - the administration of SQ, PSQ and IBQ (third session);
 - the administration of 16PF and SAT-P (fourth session).
- AD patients were included into the study if they reported a Mini Mental State Examination score of ≥ 20 (23) and a Clinical Dementia Rating of 1. Participants were excluded if they had any significant neurological disease other than AD or comorbid psychiatric condition, any history of significant brain lesion or head trauma and psychoactive medication intake. The participants provided written informed consent. No patients dropped out of the study during the observation period because they were exhaustively and preventively well-informed about the aims of the study directed to the investigation of psychological dimensions beyond the neuropsychological evaluation. The description of psychological dimensions of sufferance as well as their impact on daily living represented the

core of the information given to patients. They were also helped by motivated caregiver, too, during the assessment sessions.

After a descriptive analysis of neuropsychological results, Spearman's rho correlations were performed among psychological and clinical measures to detect specific associations of variables able to reveal psychological and behavioral aspects characterizing patients with early AD.

Results

Demographic data and neuropsychological evaluation scores are first shown in Table 1.

The neuropsychological assessment showed results typically depicting cognitive profile of early AD patients. As expected, of 21 patients 18 (85.7%), 17 (81%), and 19 (90.5%) reported scores below norms on Memory of Prose, Corsi Suvra-span learning and TMT Part B, respectively, highlighting an impairment of long-term episodic memory (both verbal and visuospatial) and divided attention whereas 3 patients (14.3%), 4 patients (19%), and 2 patients (9.5%) had normal performance in these tests, respectively. Selective attention was slightly impaired: 8 patients (38.1%) reported scores below the norms on Visual Search Test, 2 patients (9.5%) reported scores at inferior limits of norms whereas the majority of the sample, that is 11 patients (52.4%), had normal performance. The whole sample consisting of 21 patients (100%) performed poorly on Rey-Osterrieth Complex Figure 10-minute Delayed Recall, confirming the presence of a visuospatial memory impairment whereas the Copy of the

Figure was substantially adequate although often slow. Conversely, short-term memory (both verbal and visuospatial) was relatively spared, as confirmed by scores on Digit span and Corsi Span: only 3 patients (14.3%) performed poorly on these tests while 18 (85.7%) performed normally. Moreover, a linguistic deficit was present in 5 patients (23.8%) and the remaining part of the sample, i.e. 16 patients (76.2%) showed normal performance in this test. Finally, 13 patients (61.9%) showed a deficiency of logical reasoning differently from 8 patients (38.1%) that performed normally on Colored Progressive Matrices, by revealing how frontal domains frailty may often represent a neuropsychological hallmark along with episodic memory damage in early AD.

As reported in Table 2, scores obtained by AD patients on SQ and IBQ overlapped with those reported Italian population (17, 19).

Moreover, AD patients showed a moderate dissatisfaction about their mental efficiency even though results on SAT-P outlined that they were globally satisfied about their QoL (Table 3).

Significantly, PSQ V scale score negatively correlated with SQ a ($\rho = -.81$, $p < .001$), d ($\rho = -.80$, $p < .001$), A ($\rho = -.78$, $p < .001$) and D ($\rho = -.83$, $p < .001$) scales scores, pointing out that patients reporting to hold vitality, energy and stress-resistance less complain of anxiety and depression symptoms. Furthermore, patients depicting themselves as being very meticulous, precise and punctual reported few somatic symptoms, as revealed by negative correlations between PSQ PP scale score and SQ s ($\rho = -.65$, $p < .01$) and S ($\rho = -.64$, $p < .01$) scales scores.

PSQ L scale score was positively correlated with SQ scale a ($\rho = .86$, $p < .001$) and A ($\rho = .85$, $p < .001$) scores. Such a result indicated that patients who are too busy and struggle to break away from commitments are those reporting more anxiety symptoms. IBQ GH scale score correlated with SQ a ($\rho = .78$; $p < .001$), d ($\rho = .72$; $p < .001$), A ($\rho = .90$; $p < .001$), and D ($\rho = .66$, $p < .01$) scales scores. As expected, the patients presenting a phobic concern about their physical health experience more anxiety and depression.

PSQ V scale score was positively correlated to SAT-P SF scale score: patients who feel more vital, energetic and stress resistant are more satisfied about

Table 1. Descriptive analysis of socio-demographic variables and screening measures of the sample

Socio-demographic and clinical variables	Total	Males (N= 13)	Females (N= 8)
Age	70.5±6.8	70.3±6.6	70.8±7.1
Education	6.6±2.3	6.9±2.3	6.1±1.9
MODA	81.8±7.8	81.8±8.0	81.9±7.2
ADL	5.0±1.6	5.0±1.8	5.1±1.5
IADL	5.1±1.8	5.1±1.7	5.1±1.8

Note: MODA=Milan Overall Dementia Assessment; ADL=Activities of Daily Living; IADL=Instrumental Activities of Daily Living

Table 2. SQ and IBQ scales: Minimum, Maximum, Mean, Standard deviation and z-scores

Subscales (range)	Min	Max	Mean	SD	Z
SQ					
a (0-17)	0	11	3.48	3.84	-0.40
d (0-17)	0	10	3.90	3.42	-0.18
s (0-17)	1	13	5.19	4.29	0.19
ah (0-17)	0	7	2.62	2.48	-0.24
r (0-6)	0	3	1.14	1.15	-0.67
c (0-6)	0	5	1.76	1.26	-0.03
sw (0-6)	0	5	2.76	1.37	0.12
f (0-6)	0	1	0.62	0.50	-0.18
A (0-23)	0	13	4.62	4.59	
D (0-23)	0	12	5.52	4.11	
S (0-23)	1	16	7.81	4.53	
AH (0-23)	0	8	3.43	2.77	
IBQ					
GH (0-9)	1	7	3.81	2.18	0.13
DC (0-6)	0	4	2.05	1.43	-0.36
PS (0-5)	1	4	2.14	0.91	0.19
AI (0-5)	2	5	3.29	1.06	0.20
AD (0-5)	0	4	2.24	1.48	-0.42
D (0-5)	3	5	4.10	0.83	1.12
I (0-5)	0	3	1.05	1.16	-0.86

Note: SQ=Symptom Questionnaire; a=anxiety symptoms; d=depressive symptoms; s=somatic symptoms; ah=anger-hostility symptoms; r=relaxed; c=contented; sw=somatic well-being; f=friendly; A=Anxiety; D=Depression; AH=Anger/Hostility; S=Somatic (S); IBQ=Illness Behavior Questionnaire; GH=General Hypochondriasis; DC=Disease Conviction; PS=Psychological *versus* Somatic perception of illness; AI=Affective Inhibition; AD=Affective Disturbance; D=Denial; I=Irritability

their social functioning. In addition, PSQ total score was negatively correlated to SAT-P PF scale score ($\rho=-.72$, $p<.001$): patients who have a stressful life-style are less satisfied about their physical functioning.

A tendency to depression was evident in patients thinking to be severely affected by the disease and not taking into account clinicians' reassurances, as shown by the correlation between IBQ DC scale score and SQ D ($\rho=.91$, $p<.001$) scales scores. IBQ D scale score was negatively correlated to SQ r ($\rho=-.71$, $p<.001$) and sw ($\rho=-.72$, $p<.001$) scale scores. Such a result indicated that patients' tendency to deny psychological troubles result in minor relaxing and wellbeing sensations. IBQ GH scale score was negatively correlated to SAT-P SEL scale score ($\rho=-.72$, $p<.001$): the pa-

Table 3. Items and scales of SAT-P: Minimum, Maximum, Mean and Standard deviation

SAT-P items and scales	Min	Max	Mean	SD
1) Quality of sleep	0	86	70.3	28.7
2) Amount of sleep	0	100	71.9	30.5
3) Quality of food	80	100	89.1	7.8
4) Eating behavior	52	100	82.5	17.1
5) Resistance to physical fatigue	0	100	55.8	35.3
6) Physical wellbeing	0	100	59.2	30.4
7) Physical appearance	0	97	61.2	36.5
8) Physical mobility	0	100	66.2	36.1
9) Level of physical activity	0	93	57	36.3
10) Frequency of sexual intercourse	0	89	57.5	24.9
11) Quality of sexual intercourse	0	74	56	22.3
12) Resistance to stress	2	100	69.2	31.1
13) Mood	45	80	60.9	12.9
14) Mental efficiency	0	85	34.7	27.8
15) Emotional stability	0	87	58.2	30.8
16) Self-confidence	47	100	78	18.2
17) Problem solving ability	25	95	70.9	25.6
18) Psychological autonomy	70	100	83.8	10.9
19) Self-control	77	100	86.2	9.9
20) Type of work*	-	-	-	-
21) Organization of work*	-	-	-	-
22) Professional role*	-	-	-	-
23) Work productivity*	-	-	-	-
24) Free time	0	96	69.8	31.6
25) Free time activity	5	91	66.2	28.9
26) Social image	0	100	71.5	32.5
27) Couple relationship	0	100	70.7	31.8
28) Family role	48	100	81.7	16
29) Relationship with members of your family	70	100	88.6	11.1
30) Relationship with your friends	79	100	89.8	8.9
31) Relationship with colleagues*	-	-	-	-
32) Financial situation	45	95	76.1	16.1
PsF	44	83	69.8	13.3
PF	4	85	57.1	27.9
SEL	40	95	76.9	16.6
SF	50	82	67.9	11.7

Note: *Scores of items concerning job 20-23 and 31) were omitted because all the patients were retired); PsF=Psychological Functioning; PF=Physical Functioning; SEL=leap-Eating-Leisure

tients presenting a phobic concern about their physical health are less satisfied of the quality of sleep, eating and leisure.

Correlations shed light on a specific description of AD patients' personality traits, too. A negative correlation was found between 16PF-C Factor F and SQ A ($\rho=-.81$, $p<.001$) and D ($\rho=-.82$, $p<.001$) and between 16FP-C Factor Q2 and SQ A scale

($\rho = -.91, p < .001$). The first result indicated that people describing themselves as introverted, reserved, rigid and inhibited experience more anxious and depressive symptoms. The latter result indicated that more people are dependent and influenced by others and need their approval more they are anxious. Furthermore, somatic symptoms are highly present in patients that are restless and intolerant, as found by the negative correlation between 16PF-C Factor Q4 and SQ S scale ($\rho = -.89, p < .001$). Finally, 16PF-C F score was positively correlated with SAT-P PsF ($\rho = .80, p < .001$), PF ($\rho = .81, p < .001$) and SEL ($\rho = .87, p < .001$). The patients who are extroverted, not inhibited and unworried are more satisfied about their psychological and physical functioning, sleep, eating and leisure quality. The patients who are more satisfied for sleep, eating and leisure quality are more self-sufficient and independent, as revealed by the correlation between 16PF-C Q2 scale score and SAT-P SEL scale score ($\rho = .79, p < .001$).

Finally, patients thinking to be severely affected by the disease, not taking into account clinicians' reassurances and presenting affective instability reported low satisfaction about physical functioning, as shown by the negative association between SAT-P PF and both IBQ DC and D scales scores ($\rho = -.83, p < .001$, $\rho = -.64, p < .01$, respectively).

Discussion and conclusions

The neuropathological course of AD is characterized by a progressive decline of cognitive abilities, starting from episodic memory and executive dysfunction (24, 25). Progressive cognitive decline and functional ability reduction significantly affect patients' QoL and social care of AD patients, and non-pharmacological interventions are currently adopted for different purposes, such improving cognition, sustaining personal and instrumental autonomy of patients, reducing BPSD and alleviating caregiver's burden (26, 27).

Interestingly, along with cognitive decline a series of psychological and behavior manifestations of AD is probably due to a complex interplay of psychological, social and biological factors and a considerable part of patients' suffering and caregivers' distress relate directly to them (28).

Insight reduction occur in the majority of AD patients even at the onset of the disease and represents a predictive factor for the manifestation of severe apathy, agitation, irritability and behavioral symptoms during its course (29). A tendency to deny anxiety, depressive and somatic symptoms by AD patients accounting for their difficulty to express painful emotions might be present. Such a tendency provoking a continuous apprehensive expectation seems to reduce relaxing and wellbeing sensations and particularly affect some aspects of patients' life (i.e., sleep, eating and leisure).

Moreover, excessive worrying and misinterpretation about normal body sensations (i.e., hypochondriasis) results in a higher level of anxiety and depression, also because of the disruption of social, occupational and family functioning as a consequence of disordered thinking of patients.

The AD patients result to be satisfied about their functioning when sustained by precision, punctuality and vigor, and they do not report remarkable dysfunctional lifestyles and stress-related behaviors.

Specific personality traits have not been exhaustively examined in the context of AD (30). Our study outlines how reduced liveliness and self-reliance may play a critical role for anxiety and depressive symptoms. Conversely, liveliness and self-reliance are positively related to higher levels of satisfaction in psychological and physical functioning and sleep-eating-leisure.

Our study presents some limitations. First, as a pilot study, it should be implemented by a more extensive data collection. Second, longitudinal follow-ups are recommended for this kind of investigations to detect significant changes of psychological, neuropsychological and clinical measures during AD progression.

Management of health care needs of AD patients is influenced by many factors, such as psychiatric symptoms and wellbeing aspects, dysfunctional lifestyles and stress-related behaviors, illness perception and personality traits. Our findings support the usefulness of a multidimensional approach for a comprehensive evaluation of early AD than standardized neuropsychological assessment alone. By this way, health practitioners can be able to determine patient's medical, psychosocial and functional problems, with the aim of developing a whole plan for treatment and rehabilitation, improving clinical practice guidelines

on detection and management of dementia, and supporting caregivers dealing with the stress of caring for a loved one with AD.

Since in AD patients the occurrence of negative outcomes such as institutionalization, hospitalization and mortality results from a combination of biological, functional, psychological, pathological and environmental factors, diagnostic tools that effectively identify patients with high risk patterns should be part of a multidimensional approach routinely adopted in clinical practice.

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Correspondence:

Davide Maria Cammisuli, Ph.D.,

Laboratory of Clinical Psychology, Psychophysiology and

Clinical Neuropsychology, Department of Medicine

and Surgery, University of Parma, Parma, Italy

Via Volturno, 39 - 43126 Parma, Italy

Tel. +39-0521-034829

E-mail address: davide.cammisuli@unipr.it