Changes in emotional and behavioral symptoms of Alzheimer's disease

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Abstract

Emotional distress and disruptive behaviors were assessed for 26 persons with Alzheimer's disease (AD) at admission to a research registry and again three years later. Average prevalence of disruptive behaviors increased, as did the variability among patients in these characteristics. Individual differences in disruptive symptoms at initial assessment were unrelated to symptom status three years later. Emotional symptoms decreased on average and the patient group became more homogeneous in this symptom dimension. Nonetheless, individual differences in prevalence showed significant stability over three years. These differences in pattern of average change and predictability of changes suggest the importance of studying behavioral change in Alzheimer's disease in terms of individual differences as well as group trends within specific symptom clusters.

Introduction

Behavioral symptoms occur frequently in Alzheimer disease (AD). They are associated with excess disability, increased caregiver distress, and risk for institutionalization.[1-3] Among the clusters of behavioral symptoms identified[4] are emotional distress, *i.e.*, depression and anxiety, and disruptive behaviors, including agitation, aggression, and wandering. The distinction between these two symptom clusters is important because of differences in their correlates or course.[3,5-7]

There have been a number of longitudinal studies describing change in terms of the average levels or average prevalence of such behavioral symptoms at different points in the illness.[4-14] However, there is a second parameter of variability in symptoms over time as well. This is in the consistency or stability of individual differences, that is, the extent to which persons within a group are in the same relative rank order at both assessments. This consistency in individual differences is indexed by the correlation between scores at two points in time. While many studies have reported the stability of individual differences for behavioral symptoms in AD patients over relatively short periods of time (≤ two months),[4,12-17] we know of only one study that has evaluated the stability of individual differences in these symptoms over a substantially longer time frame.[7] Marin and associates[7] studied the stability of individual differences in symptoms over one year and found significant correlations over that time period for many of the behaviors assessed by the non-cognitive portion of Alzheimer's Disease Assessment Scale (ADAS-NC).[12] Significant stability of individual differences for some of these behaviors (delusions, decreased concentration, tearfulness, and tremors) was also reported over two years.[7]

It is important to note that the stability of individual differences is independent of the changes in average level of symptoms in a group. That is, the relative rank ordering of individuals within a group can be stable or unstable over time while the average level of the symptom increases, decreases, or remains the same.[18] Further, examining only change at the group level can mask change among various individuals within the group.

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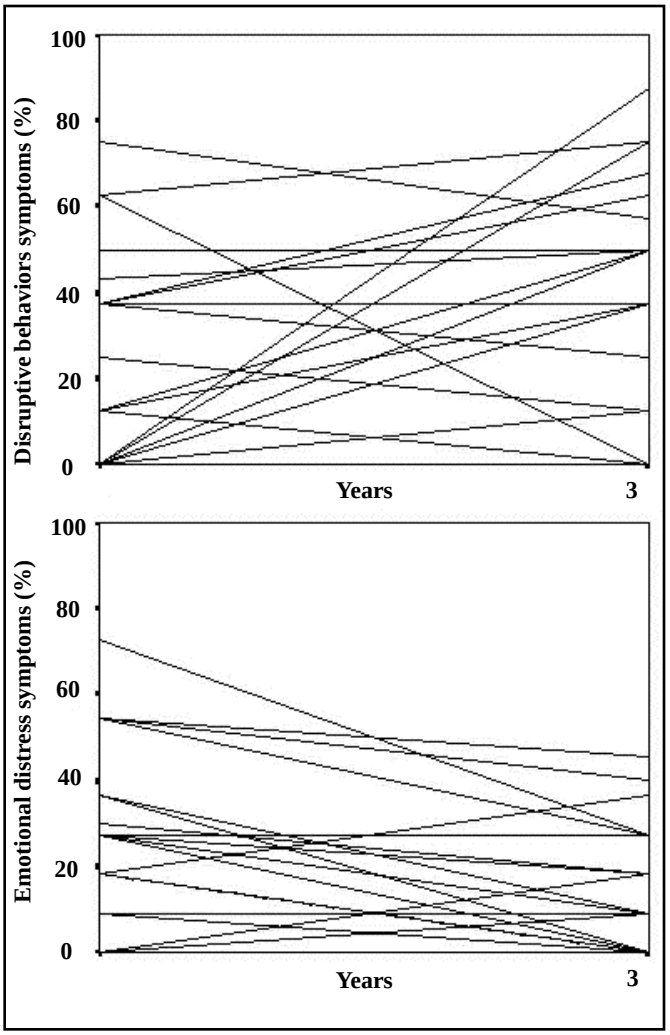

Figure 1. Percentage of disruptive behaviors and emotional symptoms at entry and three years later for each patient.

Thus, it is important to examine change at both the group and individual differences level.

In this article, we report the results of an investigation of change in the average prevalence of emotional symptoms (depression and anxiety) and disruptive behaviors (wandering, aggression, agitation, irritability) over three years and in the stability of individual differences in these symptom clusters over this time.

Method

The data were derived from two assessments of 26 Euro-American patients (69 percent women) conducted three years apart. All participants were registrants at the University Hospitals of Cleveland/Case Western Reserve University Alzheimer's Center and met DSM III-R and National Institute of Neurological Disorders and Stroke-Alzheimer's Disease and Related Disorders Association criteria for probable AD, which are described elsewhere.[19] Written informed assent/consent was obtained from patients and caregivers. On average (M ± SD), participants were 68 ± 7.0 years old, had 12 ± 2.6 years of education, and had been ill for 4 ± 3.4 years. At study entry, the average level of impairment was moderate on the Mini Mental State Exam (MMSE)[20] (M ± SD = 18 ± 5.5; Range = 4 - 29) and mild on the Clinical Dementia Rating Scale (CDR)[21] (M ± SD = 1.1 ± 0.6; Range = 0.5 - 3.0). The 11-item Blessed Scale[22] reflected mild functional impairment (M ± SD = 3.6 ± 2.4, Range = 0.5 - 11.0). The patients were substantially worse at the three year follow-up, of course [Ms ± SDs of 10.7 ± 8.2; 2.40 ± 0.9; and 9.6 ± 3.7 for the MMSE, CDR, and Blessed, p's < .001].

Disruptive behavior was assessed by eight relevant items selected from the Cornell Scale for Depression in Dementia[23] and the Behave-AD[24] that had been administered following standard procedures by trained examiners.[19] The items pertained to wandering, purposeless or inappropriate actions, agitation, irritability, verbal outbursts, and physical threats (Items: Cornell 4,5; Behave-AD 13-18). Eleven items were selected to describe emotional distress (Items: Cornell 1-3, 8, 16-18; Behave-AD 20-23). These items concerned non-vegetative symptoms of anxiety, fear, sadness, lack of reactivity to pleasant events, loss of interest, suicidality, depressed mood, tearfulness, self-blame, and pessimism. Since the Cornell and the Behave-AD ratings are made on scales with different numbers of units, symptoms were rescored as present or absent. The total number of symptoms present in each scale was summed, divided by the number of items to standardize the two scales to a comparable frame, and multiplied by 100 to indicate the percentage of possible symptoms present for each participant. Thus for both the Disruptive Behavior and Emotional Distress scales, scores ranged 0 to 100 percent, with 0 representing the complete absence of the symptom cluster and 100 indicating the presence of all symptoms in the cluster. The internal consistency reliability of the scales was .70 for Disruptive Behavior and .72 for Emotional Distress. Because of missing data, emotional symptom scores could not be computed for three persons.

Results

On average, patients had about 22 percent of possible disruptive behaviors at study entry (SD = ± 22.9), which increased by about half over three years (M ± SD = 34.4 percent ± 27.3). This difference is significant ($p < .05$), by nonparametric signed-rank test (see Table 1). The variability of the scores, which indexes individual differences within the group, also increased over three years

Table 1. Percentage of disruptive behaviors and emotional symptoms (M ± SD)				
	Entry	**Three years later**	**Wilcoxian signed ranks test Z**	**p**
Disruptive behaviors	22.3% ± 22.9	34.4% ± 27.3	-1.99	< .05
Emotional symptoms	25.0% ± 19.6	14.8% ± 14.4	-2.40	< .05

(by 42 percent). This variability is depicted in the top panel of Figure 1, which shows the disruptive behavior scores of each patient at the two assessments. The scores for each patient are connected with a line to identify paired scores. Patients with the same scores are represented by the same line. As may be seen in this figure, there is substantial heterogeneity in change over the three years. Even though the average level of symptoms increases, there are a substantial number of patients for whom disruptive behaviors decline or stay the same. There is no systematic relationship between the relative prominence of disruptive behaviors among patients at the two assessments (Spearman rho = .28) indicating little stability in individual differences over time.

Table 1 also shows that the prevalence of emotional symptoms, which was at approximately the same level as disruptive behaviors at study entry (25.0 percent), decreased substantially over the three years (14.8 percent, $p < .05$). As may be seen in the table, there is also considerable variation among patients in emotional symptoms at the initial assessment. The pattern of changes over time for emotional symptoms is different from that for disruptive behaviors. Three years later, there is much more similarity among patients in emotional symptoms-the variance of scores decreased by 46 percent. As inspection of Figure 1 suggests, there is substantial consistency in relative prominence of emotional symptoms among individuals over the three years. The correlation between the two assessments was significant (Spearman rho = .47, $p < .05$).

Discussion

The results of this study suggest that there are distinct patterns of change in emotional and behavioral symptoms over three years in Alzheimer's disease. The differences in the course of emotional symptoms and in disruptive symptoms can be observed in both group tendencies (averages) and in the stability of variation among patients (SDs and correlations).

On average, disruptive behaviors increase over three years as cognitive status and functional competence decline. The variability among patients also increases over this time indicating that patients become more distinctively different from each other over several years. However, the relative level of disruptive behavior reported early in dementia was not indicative of relative disruptive behavior later in the course of the disease. Patients who tended to have the most symptoms at study entry did not necessarily have the most symptoms three years later. Emotional symptoms, on the other hand, decline in average level and there is a decrease in variation among patients. They become more like one another in level of anxiety and depression over time. Reduced variability in a group tends to attenuate the correlation of a measure.[18] Nonetheless, although the variability in emotional symptoms decreases by 46 percent, there is a significant correlation between the two assessments.

The inconsistency in individual differences for disruptive behaviors confirms the results of Marin *et al*,[7] who report a lack of stability in individual differences over two years for uncooperativeness, pacing, and increased activity. On the other hand, our observation of consistency in symptoms of emotional distress over three years is different from Marin and associates'[7] findings. They reported a small correlation (.23) for tearfulness and no significant correlation for depressed mood over two years. One reason for the discrepancy may be that Marin *et al*[7] analyzed these specific symptoms individually, while in this study several symptoms of emotional distress were aggregated for greater reliability.

The distinct patterns of change for emotional distress and disruptive behaviors found in this study suggest that these symptoms may reflect quite different processes in AD. As we have noted, there is decline in overall levels of emotional symptoms but stability in individual differences. There is some evidence of continuities between pre-morbid personality traits and emotional symptoms in AD.[25] The present results suggest the hypothesis that this continuity may persist at least some time into the course of the

illness. On the other hand the absence of stable individual differences in disruptive behaviors suggests that variable individual patterns of change over time, along with an overall trend of increase in these behaviors, is reflective of disease-specific processes. In particular, one may hypothesize that frontal system neuropsychological deficits are associated with individual variation in level of disruptive behaviors. Neuropsychological deficits in frontal lobe functions are associated with behavioral disturbances,[26] similar to those seen in AD.

The findings of this study have clinical implications as well. For example, the expectation of declines in emotional symptoms might be tempered by the appreciation that patients with relatively prominent anxiety and depression are likely to continue to be relatively high in these characteristics. In contrast, the course of disruptive behaviors would seem less predictable on the basis of initial presentation of a patient.

Limitations of this preliminary study must be noted. Only two time points were assessed. Consequently, it was not possible to study the shape of the trajectory of change over time. The sample size was small, and so there was insufficient statistical power to examine relations between cognitive or functional change and changes in behavioral symptoms. In addition, the scales used to describe symptoms did not assess clinical severity. The findings nonetheless suggest the value of additional study of individual differences in symptom stability over time and their correlates.

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