

Delusions in Patients with Very Mild, Mild and Moderate Alzheimer's Disease

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Abstract-

Purpose: To compare the prevalence of delusions in different stages in Taiwanese patients with very mild to moderate Alzheimer's disease (AD).

Methods: A consecutive series of 91 patients with probable Alzheimer's disease visited the dementia clinic in a regional hospital in mid-Taiwan were enrolled in this study. All patients were examined with the Neuropsychiatric Inventory (NPI), the Cognitive Abilities Screening Instrument (CASI), and the Clinical Dementia Rating (CDR) scale.

Results: The prevalence rate of any delusion in very mild, mild and moderate AD was 35.2%. Delusions of other persons are stealing was most common (27.5%), followed by delusions of self is in danger (15.4%), house is not his/her home (5.5%), family plans to abandon him/her (4.4%), spouse is having an affair (2.2%), an unwelcome guest is living in the house (2.2%), media persons are in the house (2.2%), and others aren't who they claim (1.1%). The prevalence rates of delusions is 33% in very mild AD, 30% in mild AD and 48% in moderate AD. AD ($P>0.05$).

Conclusions: Delusions are common neuropsychiatric symptoms in very early stage as well as in later stages of Taiwanese patients with AD and it deserves the attention that delusions may be characteristic of very mild AD.

Key Words: Alzheimer's disease, Delusions, Dementia clinic, Mid-Taiwan

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INTRODUCTION

Alzheimer's disease (AD) is a disease not only with cognitive dysfunctions but also with behavioral and psychological disturbances. The first case described by Alois Alzheimer (1907) was a 51-year-old woman in

whom focal cognitive defects were associated with delusions of jealousy and auditory hallucinations. Delusions are unshakable false beliefs that are out of context with the person's social and cultural background⁽¹⁾. Delusions, as well as hallucinations, are main features of psychosis and they are the most common and destructive neu-

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ropsychiatric symptoms in dementia of Alzheimer's type. There is increasing interest in psychotic symptoms of dementia and a number of studies have attempted to investigate phenomenology as well as etiologic factors for these symptoms. The reported prevalence of delusions among individuals with AD ranged from 10% to 73%⁽²⁾ and they are obvious in the moderate to late stages of AD⁽³⁻⁵⁾. However, delusions may also occur in very mild AD and one study showed among common incipient symptoms of AD, delusions (8%) are secondary to memory impairment (74%)⁽⁶⁾. The significance of delusions in early stages of Alzheimer's disease became our interested issue and we proposed that there would be the same prevalence rates in earlier stages of AD compared with later stages of the disease. Therefore, the purpose of the current study was to examine and to compare the prevalence of delusions in different stages of Taiwanese patients with very mild to moderate Alzheimer's disease.

METHOD AND PARTICIPANTS

Participants

The study was conducted in a dementia clinic in a 500-bed regional hospital in mid-Taiwan. A consecutive series of 91 patients with very mild to moderate probable Alzheimer's disease were enrolled in this study. The AD patients were diagnosed according to the criteria for primary degenerative dementia in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and by the criteria for probable AD developed by the National Institute of Neurologic and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA).

Method

All patients received a neuropsychological screening test using the Cognitive Ability Screening Instrument (CASI) and an examination of brain CT or MRI, with a result of either a normal or aging brain. They also underwent extensive laboratory tests to rule out other possible causes of dementia. The stages of dementia were

acquired using the Clinical Dementia Rating (CDR) scale. Only patients with CDR ratings of 0.5 (very mild), 1 (mild) or 2 (moderate) were selected in this study. We used the 12-item version of the Neuropsychiatric Inventory (NPI) that divided mental/behavioral phenomena into 12 domains on the basis of observations within the past month. The NPI domain of delusions included ratings on eight individual forms of delusions. All of the 12 NPI domains were rated on symptom frequency from 1 (occasionally) to 4 (very frequently), on symptom severity from 1 (mild) to 3 (severe), and on caregiver burden from 0 (none) to 5 (extremely).

Statistics

The means of the variables of demographical and neuropsychological data were assessed statistical significance with t-tests. The significance of group differences in the prevalence of delusions was checked by the χ^2 test.

RESULTS

A total of 91 patients participated in this study (60 women and 31 men, with a mean age of 71, S.D. 5.8). Their mean length of education was 5.3 years (SD, 5.2 years, ranging from 0 to 18). The mean score of CASI was 67 (SD, 20, ranging from 29 to 89). The comparisons between delusional group and non-delusional group showed that there was an older age in delusional group ($t=0.328$, $df=89$, $p=0.002$). No significance was found in education, sex, MMSE or CASI. There was no significance in CDR stage (Chi-Square=1.884, $df=2$, $p=0.390$) but a higher Clinical Dementia Rating Sum of the Boxes (CDR-SB) was found in delusional group ($t=2.555$, $df=89$, $p=0.012$). The sum of frequency \times severity in 12 domains in NPI ($t=4.105$, $df=89$, $p=0.000$) and the sum of caregiver burden in 12 domains in NPI ($t=5.872$, $df=89$, $p=0.000$) were significantly different between two groups.

The prevalence of any delusion in all AD patients was 35.2%. Delusion of other persons are stealing was most common (27.5%), followed by delusion of self is in danger (15.4%), delusion of the house is not his/her

Table 1. The demographic data and neuropsychological findings

	AD without delusions	AD with delusions	p-value
N (%)	64.8	35.2	
Age, mean years (S.D.)	73.2 (8.4)	78.9 (7.35)	0.002
Sex, % women (S.D.)	61.0 (0.5)	59.4 (0.5)	0.880
Education, mean years (S.D.)	5.34 (4.5)	6.13 (5.1)	0.448
MMSE (S.D.)	17.3 (6.4)	14.8 (5.3)	0.072
CASI (S.D.)	55.2 (20.0)	50.3 (18.1)	0.227
CDR (S.D.)	1.06 (0.5)	1.20 (0.6)	0.245
CDR-SB (S.D.)	4.74 (2.5)	6.39 (3.6)	0.012
NPI-sum (S.D.)	14.3 (9.7)	26.4 (18.4)	0.000
NPI-burden (S.D.)	7.42 (2.8)	20.1 (7.2)	0.000

MMSE: Mini Mental State Examination; CASI: Cognitive Abilities Screening Instrument; CDR: Clinical Dementia Rating scale; CDR-SB: Clinical Dementia Rating Sum of the Boxes; NPI-sum: sum of 12 domains in Neuropsychiatric Inventory (frequency \times severity); NPI-burden: sum of caregiver burden in 12 domains in NPI; SD: Standard deviation.

Table 2. Prevalence of delusions

Type of delusions	N	%
Any delusion	32	35.2
Delusion of other persons are stealing	25	27.5
Delusion of self is in danger	14	15.4
Delusion of the house is not his/her home	5	5.5
Delusion of family plans to abandonment him/her	4	4.4
Delusion of spouse is having an affair	2	2.2
Delusion of an unwelcome guest is living in a house	2	2.2
Delusion of media persons are in the home	2	2.2
Delusion of other persons aren't who they claim	1	1.1

Table 3. The relationship between severity of dementia and delusions

Severity	Total AD	AD with delusions	%
CDR 0.5	21	7	33
CDR 1	49	15	30
CDR 2	21	10	48

home (5.5%), delusion of family plans to abandon him/her (4.4%), delusion of spouse is having an affair (2.2%), delusion of an unwelcome guest is living in a house (2.2%), delusion of media persons figures are in the home (2.2%), and delusion of other persons aren't who they claim (1.1%).

The prevalence of delusions in very mild (33%), mild (30%), and moderate (48%) Alzheimer's disease were not significantly different in CDR stage (Chi-Square=1.884, df=2, p=0.390).

DISCUSSION

Delusions are the most prominent feature of schizophrenia. The mechanism of delusions is not well known. With a source-monitoring task, Moritz et al.⁽⁷⁾ indicated that schizophrenic patients displayed greater confidence in memory errors compared with controls. Knowledge corruption was observed to be significantly greater in schizophrenic patients relative to controls for false-positive and false-negative judgments. They proposed that reliance on false knowledge represents a candidate mechanism for the emergence of fixed false beliefs (i.e., delusions). Cummings⁽⁸⁾ suggested that an abnormal coupling between memories of emotional content and faulty interpretation of current or past memories may produce delusion in AD. Rubin⁽⁹⁾ hypothesized that the early presence of delusions in AD may indicate active deterioration in the temporal lobes. Such hypothesis was later supported by Starkstein et al.⁽¹⁰⁾ using SPECT to study delusions in AD. There are also some other experiments studying the alteration of cerebral blood flow using SPECT showed distinct findings^(11,12). Staff et al.⁽¹¹⁾ compared the results of ^{99m}Tc-hexamethyl propyleneamine oxime (HMPAO) SPECT images in a group of AD patients with a similar autobiographic delusion and those in a group of AD patients without delusions, and a group of AD patients with a range of delusions but without autobiographic content. Their studies showed that the autobiographic AD group had a significant area of hypoperfusion in the right frontal lobe when compared with the other two groups. Fukuhara et al.⁽¹²⁾ studied the neural substrate of the delusion of theft in patients with AD using ^{99m}Tc-HMPAO SPECT revealed that AD patients with delusions of theft showed significant hypoperfusion in the right medial posterior parietal region compared to patients without delusions. Farber et al.⁽¹³⁾ compared pathological findings including the densities of neurofibrillary tangles, total senile plaques, and

cored senile plaques in subjects with psychosis vs subjects without psychosis, in several neocortical regions, the hippocampus, and the entorhinal cortex. Their result showed that subjects with psychosis had a 2.3-fold greater density of neocortical neurofibrillary tangles than did subjects without psychosis. The increase was independent of dementia severity. No similar relationship with psychosis was seen for total senile plaques or cored senile plaques.

The presence of delusions and hallucinations were both correlated to greater agitation/aggression on the NPI, even after control for depression and apathy⁽¹⁴⁾. Therefore, the appearance of psychotic symptoms may cause more caregiver distress. There have been several studies investigated the prevalence of psychotic symptoms as well as the relationship to other behavioral disturbances in Chinese or Taiwanese population with AD. For example, Hwang et al.⁽⁴⁾ studied psychotic symptoms in psychiatric inpatients with dementia of the Alzheimer's and vascular types revealing that the frequency of delusion was 59% and that demented patients with psychotic symptoms were order than those without psychotic symptoms. Chow et al.⁽¹⁵⁾ had compared neuropsychiatric symptoms of AD in Chinese and American patients and revealed that Chinese caregivers had reported delusions more frequently (58.1%) than Caucasian caregivers did (39.6%). In a study of behavioral profile of Alzheimer's disease in Chinese elderly conducted by Lam et al.⁽¹⁶⁾ in Hong Kong showed that among patients with AD, 32% had delusions and delusional ideation was significantly associated with hallucinations, aggressiveness, and affective disturbances. Diurnal rhythm disturbances were associated with activity disturbances and aggressiveness. Fuh et al.⁽¹⁷⁾ studied behavioral disorder and caregivers' reaction in Taiwanese patients with AD to evaluate the applicability of the Chinese version of the NPI and showed that delusions were the most distressing symptoms to the caregivers and the authors also reported that the NPI is a reliable tool to assess behavioral disturbance and caregiver distress in Taiwanese AD patients. In the current study, our results also revealed that delusions are common neuropsychiatric symptoms in Taiwanese patients with AD (35.2%). The higher CDR-

SB score in deluded group may indicate more severe impairments in general cognitive function and activities of daily living. The higher NPI sum score and caregiver burden score in deluded group may indicate more profound behavioral disturbances and caregiver distress. These findings are similar to others studies discuss above.

Whether delusions are characteristic of very mild AD is an interesting issue of this study. Most of the previous researches had pointed out the relationship between delusions and later stages of dementia. For example, Leroi et al.⁽¹⁸⁾ reported data on the prevalence, severity, clinical, and demographic associations of these symptoms in a population sample of 260 persons with dementia, examined with the NPI. Their finding was that female gender appeared to be a risk factor for delusions and subjects in an earlier stage of dementia showed fewer delusions. A most recent study, conducted by Picininni et al.⁽¹⁹⁾, focusing on the behavioral and psychological symptoms in 50 consecutive Alzheimer's disease outpatients, showed a clear trend towards increasing frequency with the severity of delusions as well as hallucinations and aberrant motor activity. However, some other studies showed the appearance of delusions in earlier stage of AD. Alberca et al.⁽²⁰⁾ studied psychotic symptoms in AD and revealed that delusions appeared earlier and were more frequent than hallucinations and misinterpretations. They also indicated that delusions appeared early during the course of Alzheimer's disease. There are few data regarding the severity of dementia and delusions in Taiwanese or Chinese patients with AD. A series of studies conducted by Hwang et al. regarding delusions in psychiatric inpatients with AD and/or other dementias showed high rates of various types of delusions but the relationship between the severity of dementia and delusions were not shown in their findings. Pai and Hsiao⁽⁶⁾ studied incipient symptoms of AD in southern Taiwan and revealed that delusions account for the second common initial symptom in AD (8%). Findings in our study also showed that delusions may be characteristic of very mild AD.

In summary, the deluded AD patients are associated with more functional disability, more behavioral and

psychological disturbances, and more caregiver burden. We conclude that delusions are common neuropsychiatric symptoms in Taiwanese patients with very mild, mild and moderate AD and it deserves the attention that delusions may occur in very early stage as well as later stages in AD.

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