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Utilising neuropsychological assessment in the early diagnosis and cognitive intervention of patients with Alzheimer's disease

Key Messages

The Hong Kong List Learning Test and the Dementia Rating Scale have been validated for use with Hong Kong Chinese patients with dementia.

Introduction

The assessment and management of patients with dementia is increasingly challenging as increased life expectancy puts an additional burden on health care needs and expenses. The clinical diagnosis of Alzheimer's disease (AD), the most common pathological condition underlying dementia, requires a clinical examination as well as confirmation by neuropsychological tests. Mental status examinations are assessment tools developed for documenting the presence and severity of cognitive impairment, tracking the progression of dementia over time, and assessing the effects of potential therapeutic agents on the cognitive function of demented patients.[1] Nonetheless, a sensitive assessment tool that is capable of quantifying the multi-dimensional nature of cognitive processing is not available in Hong Kong.

Aims and objectives

This study aimed to establish the sensitivity and validity of the Mattis Dementia Rating Scale (DRS) and the Hong Kong List Learning Test (HKLLT) for elderly Chinese in Hong Kong.[2]

Methods

Sample size

This study was conducted from July 2000 to August 2001. Control subjects were volunteers who had no history of cognitive impairment, substance abuse, neurological or psychiatric disorders, or head injury. They were recruited from various community recreational centres for the elderly in Hong Kong. Patients with AD were diagnosed by senior psychiatrists according to the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) diagnostic criteria.[3]

Study instruments

The Chinese version of the DRS consists of 36 tasks that assess a range of cognitive competencies. There are five subscales providing information on specific abilities: attention, initiation/perseveration, construction, conceptualisation, and memory. The maximum possible scores for the subscales are 37, 37, 6, 39, and 25, respectively.

The HKLLT is a Chinese verbal learning test with local normative data. It consists of two 16-word lists; all words are two-character nouns. The words in the first list come from four categories and are organised randomly (random condition), while the second list consists of words from another four categories that are semantically clustered (blocked condition). There are three immediate recall trials, two delayed recall trials, and one recognition task.

Testing procedure

To ensure proper test administration, each participant was tested individually in a quiet room by a trained examiner. The assessment took place in community

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recreational centres for the normal elderly participants, and in the hospital for the AD participants. The DRS was administered following previously established procedures,[4] except that all the items were administered. Written informed consent was obtained prior to the test session from all participants or their caregivers.

Results

In total, 181 subjects participated in the study; 83 normal controls and 40 patients with AD were tested with the DRS, and 30 normal controls and 28 patients with AD were tested with the HKLLT.

Although the educational level varied greatly between the groups, ranging from no formal education to post-graduate college education (20 years of education), the mean years of education for the normal controls and AD participants were not significantly different (t[121]= –0.137, P>0.05). The mean ages of the normal controls and the AD patients were significantly different (t[121]= –3.31, P<0.05), although the difference was only 4 years. The two groups of participants showed significant differences in their performances in both the Chinese version of the Mini-Mental State Examination (CMMSE) (t[121]=12.35, P<0.01] and the DRS (total score; t[121]=10.67, P<0.01).

Questionnaire validation

To assess the validity of the Chinese version of the DRS, Pearson's correlation coefficients between the CMMSE and the DRS scores were computed. All DRS scores correlated significantly with the CMMSE score, confirming the construct validity of the Chinese version of the DRS. Except for the 'construction' subscale, the total and other subscale scores were significantly affected by the educational level and/or age of the participants suggesting that in general, the older and less educated elderly participants scored lower on the DRS. The age- and education-adjusted DRS scores demonstrated an 85% sensitivity in differentiating patients with dementia.

The 28 AD patients performed significantly less well in the acquisition and retention, and external organisational cues dimensions of the HKLLT. No significant differences in total learning were found between the random and blocked conditions. Semantic clustering in the blocked condition was most predictive of mild and moderate AD.

Discussion

The study demonstrated the clinical applicability, reliability, and validity of the Chinese DRS for screening and assessing cognitive functions of elderly Chinese. The effect of age and level of education on DRS performance is consistent with other studies and adjusting for age and education increased the sensitivity of the test. Further analysis suggests that an abbreviated Chinese DRS might be feasible. Among the five subscales, both the 'initiation/perseveration' and 'memory' subscales contributed the most in differentiating between AD patients and the normal elderly.

We examined in detail the episodic memory of Hong Kong Chinese AD patients with a locally developed list learning test, comparing procedures that did or did not encourage the use of semantic organisation. Chinese AD patients performed significantly less well in acquisition and retention, and benefited significantly less from external organisational cues. Furthermore, the rate of forgetting in the random condition and the total retention score in the blocked condition were the best predictors for differentiating between AD patients and normal controls. These recall measures, however, did not differentiate well between mild and moderate AD patients. Instead, semantic clustering in the blocked condition was a more useful discriminating variable.

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