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Impaired cognitive performance in patients with chronic burnout syndrome

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Abstract- Chronic burnout refers to a syndrome caused by chronic stress. Clinical observations indicate that chronic burnout is associated with impaired cognitive functioning. However, there have been no systematic studies of the cognitive performance in chronic burnout patients. We have evaluated generalcognitiveability,memory,andattentionin67female patients treatedforchronicburnout.The patients and 15 healthy control subjects were tested with standardized tests of verbal and nonverbal cognitive ability (WAIS), verbal (Claeson–Dahl) and nonverbal (Rey complex figures) memory, and visual and auditory attention (IVA). Significant reductions in nonverbal memory and auditory and visual attention were found for the patient group. These results indicate that patients with chronic burnout have specific cognitive impairments, which should be emphasized in the evaluation of symptoms and treatment regimes in this disorder. # 2004 Elsevier B.V. All rights reserved.
Keywords: Chronic burnout; Stress; Cognition; Memory; Attention; Processing speed

1. Introduction

Chronic burnout (CBO) refers to a syndrome caused by chronic stress. It is characterized by exhaustion, sleeping problems and depersonalization. CBO is defined in ICD-10 as ‘‘problems related to socio-economic and psychosocial factors’’. However, the symptomsin CBO has a high levelof co-morbidity andoverlap with otherdisorders such as chronic fatigue syndrome (CFS), fibromyalgia, and major depression (Nimnuan et al., 2001; Wessely et al., 1999). Of main interest are frequent clinical reports of cognitive problems in CBO as well as in CFS and major depression.

Since 1995, the number of women with a diagnosis of psychiatric disorder has increased four-fold in Sweden. According to The Swedish National Social Insurance Board, 50% of these cases are believed to be work related (Board, 2003; The Swedish National Social Insurance Board, 2003). The exact number of patients with CBO in this patient population is not clear. Given the frequent reports by CBO patients of cognitive problems, the absence of detailed studies of the cognitive status of CBO patients is striking. The main purpose of the present study was to conduct a thorough examination of the cognitive performance of patients with a diagnosis of CBO. CBO patients were tested on a variety of tests that covered multiple cognitive domains, including general cognitive abilities,

attention, visuospatial functions, and memory functions.

2. Method and materials

2.1. Subjects

Seventy-five consecutive female patients referred to the Quranten Institute of Stress and Trauma with a preliminary diagnosis of chronic burnout (CBO) were considered for inclusion in the study. Before referral, primary care physicians diagnosed the subjects as suffering from CBO and made an extensive medical investigation. Subjects suffering from associated medical disorders including endocrine disorders and history of severe head trauma were excluded, as well as subjects treated with anxiolytic or psychotropic drugs. Sixty-eight patients (89%) agreed to participate. One was subsequently excluded due to previous head trauma. All subjects had a sick leave period of at least 3 months due to symptoms suggested to be due to CBO, exhaustion, sleeping problems and depersonalization (Maslach et al., 2001). In addition, prior to the sick leave, the subjects had symptoms of exhaustion for long periods of time. They all had stressors in their work situations that could be identified. All subjects reported problems with concentration and/ or memory, and complained about emotional instability.

Fifteen healthy subjects were recruited, by matching subjects according to age and education, from the Northern Sweden part of the WHO MONICA (Monitoring of trends and determinants in cardiovascular diseases) study (Pedoe, 1988). All subjects were examined by endocrinologist, to control for associated medical disorders including endocrine disorders. All subjects were examined with routine blood samples and standardized neuropsychological test battery (see below).

The subjects in the patient group had a mean of 14 years of education, and controls had 15 years of education. As shown in Table 1, affective disorder was present in 40% of patients. The most reported affective disorder was panic anxiety (19%), 7.5% of subjects fulfilled the Axis 1 criteria for major depression, and 10% for minor depression based on clinical interviews by primary care physicians. None of the control subjects reported affective disorder based on the results of the Primary care evaluation of mental disorders (PRIME-MD). questionnaire (PQ) and a 12-page clinical evaluation guide which is a structured interview (CEG) containing modules for mood, anxiety, eating disorders, alcohol abuse, social phobia, and obsessive-

compulsive disorder. Clinicians administer only those modules that are indicated by the patient on the PQ. The PRIME-MD system has been constructed to conform DSM-IV criteria (Spitzer et al., 1994; The American Psychiatric Association, 1994).

The study was approved by the ethical committee at Umea University, Sweden.

2.2. Assessments

We chose tests that should give a good overall picture of cognitive function, covering a broad range of cognitive domains. Parts of the Wechsler's adult intelligence scale-revised (WAIS-R) were used to estimate general cognitive abilities (Wechsler, 1955, 1996). This included 11 different tests, measuring verbal ability (vocabulary, comprehension, digit span, similarities, arithmetic and information), and nonverbal ability (picture arrangement, block design, picture completion, object assembly, and digit symbol).

The Claeson–Dahl inventory of learning and memory-revised (CD) consists of two phases: The first, when the subject learns a list of 10 words to be immediately recalled after presentation, measures the efficacy in the ability for immediate recall of auditory presented verbal materials (Nyman H, 2000). The second phase, where the subject 30 min after presentation is asked to recall the 10 words, is designed to test the ability to recollect the words attached to the learning situation.

The Rey complex figure test is designed to measure visuospatial constructional ability and visuospatial memory (Meyers J.E., 1995). It consists of three phases: The first (copy trial), when the subject is instructed to copy a complex figure stimuli, followed by an immediate recall trial that is administered 20–30 s after the copy trial, followed by a delayed recall trial that is administered 30–45 min after the immediate recall trial.

The intermediate visual and auditory continuous performance test (Riccio C.A., 2001; Sandford and Turner, 1995) consists of two major quotients: (1) the full scale response control quotient (FULLSCRCQ) based on equal weights of the auditory response control quotient (AUDRCQ) and the visual response control quotient (VISRCQ), and (2) the full scale attention quotient (FULLSCAQ) based on equal weights of the auditory attention quotient (AUDAQ) and the visual attention quotient (VISAQ). The AUDRCQ and VISRCQ are based on equal weights (one-third each) of their respective

prudence, consistency and stamina scales. Prudence is a measure of impulsivity and response inhibition, consistency measures the general consistency of response times and is used to measure the ability to stay on task, and stamina is used to identify problems related to sustaining attention and effort over time. The AUDAQ and VISAQ are based on equal weights (one-third each) of their respective vigilance, focus and speed scales. Vigilance is a measure of inattention, focuses reflects the total variability of the speed of mental processing and is sensitive to an unusual number of occurrences of slow reaction times, and speed measures the reaction time of all correct responses and is sensitive to problems related to slow mental processing.

2.3. Statistics

All test results were adjusted for sex and age using manuals and norms for each test, respectively. Weighted test scores were transformed into T-scores to allow comparisons with normative data. Group differences were tested with Mann–Whitney U-test due to low number of subjects with skewed distribution of data. Due to large number of variables in IVA, MANOVAwas used to test for an overall group difference in the IVA test, and ANOVAs were used to test for group differences on specificIVAtests and Rey complex test. All test results were compared relative to controls but also according to normative values for each test. For diagnostic purposes demographically corrected normative scores were used; raw scores were transformed to normalized T-scores. T-scoreshavebeenconstructedtohaveameanof50andastandarddeviationof 10. For example, a T-score of 60 would indicate that the respondent's scores exceed
thoseof84%oftherespondent'speerswithinthenormativesample.Suggested guidelines for clinical interpretation of T-score values is to consider T-score range 35–39 as mildly impaired, 30–34 mildly to moderately impaired, 25–29 moderately impaired, 20–24 moderately to severely impaired and below 19 severely impaired. Wechsler subscales use 10 to describe corrected normative mean value with a standard deviation of 3. IVA subscales use 100 to describe corrected normative mean value with a standard deviation of 15. For these tests, 1 standard deviation is considered to be clinically significant deficits.

3. Results

The result from the general cognitive ability (WAIS) testing is presented in Fig. 1. Performance on the verbal tests did not differ from controls. Both groups performed within normative values.

No differences between groups were found on tests of verbal memory (Fig. 2). Both groups performed within normative values.

In contrast, the performance of the patients on the nonverbal test (Rey) was significantly reduced for immediate as well as delayed testing (Fig. 3) compared to controls. Test performance was below expected for patients compared to normative values. An analysis of variance showed a significant effect of group in immediate recall ($F(1, 83) = 26.2$, $P < 0.001$) and delayed recall ($F(1, 83) = 21.4$, $P < 0.001$).

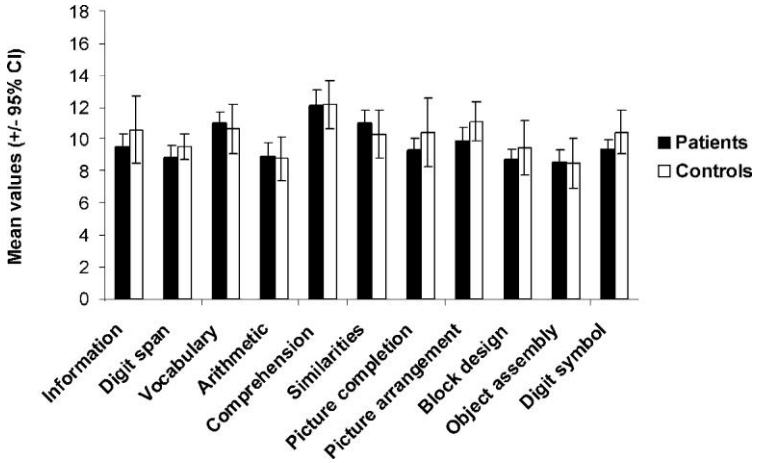

Fig. 1. Results from the Wechsler's adult intelligence scale-revised (WAIS-R). No significant group differences were seen. Expected mean value = 10.

Patients had an overall decreased performance in the IVA test, where subjects performed much below normative values for several variables (see Fig. 4; expected mean = 100). A MANOVA was used to compare the patient and control groups on all IVA variables, and an overall group effect in favor of

the controls was found, (F (17, 83) = 1.86 P = 0.039). Subsequent univariate ANOVAs revealed significant group differences (Fig. 4).

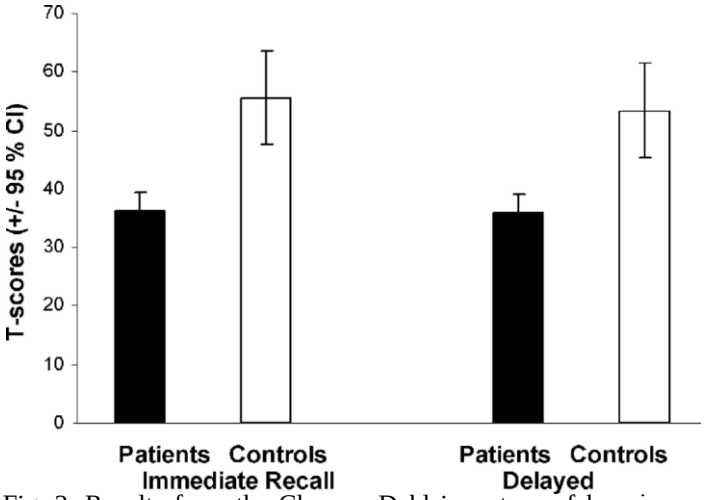

Fig. 2. Results from the Claeson–Dahl inventory of learning and memory. No significant group differences were seen. Expected mean value = 50.

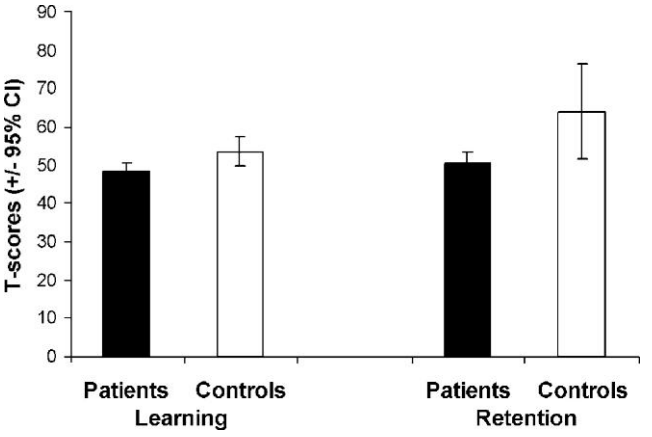

Fig. 3. Results from the Rey complex figure test, immediate and delayed recall. P < 0.001 for both comparisons between groups. Expected mean value = 50. Patients thus performed much below expected mean for both tests.

4. Discussion

The main findings in this study are that significant decreases in performance were present for CBO patients on nonverbal memory in association with slowing of performance on attention measures. Significant differences were found relative to controls. Admittedly, the size of the control group was quite small but decreased performance of CBO patients was also determined according to normative values for each test. Importantly, no abnormalities were found for verbal ability and verbal memory relative to controls and as compared to normative values. This makes it highly unlikely that lowered general motivation in the patient group was causing the observed differences. Rather, our finding that CBO is associated with specific cognitive dysfunctions points to a selective neuropsychological impairment in these patients.

The symptoms of CBO overlap with those of other disorders, such as major depression and CFS. Reductions in processing speed, working memory and learning of new information have been reported in CFS patients (Michiels et al., 1996, 1998, 1999), and the cognitive domains that most consistently are impaired in major depression include attention and episodic memory (Burt et al., 1995; Reischies and Neu, 2000; Wessely et al., 1999). A subset of the patients in our sample suffered from depression, but when subjects diagnosed as depressed (n = 19) were compared with non depressed subjects (n = 48), no differences in cognitive functions were found. This indicates that the impairments we observed for the CBO patients were not driven by depression, but further studies are needed to delineate possible differences in cognitive function between CBO and related disorders.

The basis for the cognitive impairment found in CBO patients is not clear. Long-term stress can have profound effects on neuronal functions, notably hippocampal cells (McEwen, 2000). Such neural changes can lead to deficits in memory and visuospatial functioning, and could hence contribute to the findings in this study.

Stress can also affect the function of frontal cortex (Lupien and Lepage, 2001; Moghaddam, 2002). Nonverbal tasks tend to tax frontally mediated executive processes to a greater extent than verbal tasks (Baddeley and Della Sala, 1996). Thus, the present pattern of cognitive deficits, with intact performance on tests with familiar verbal materials along with slowed speed and impaired performance on tests with novel nonverbal stimuli, is suggestive of frontal

cortex dysfunction.

It should be noted that most of the patients in this study reported sleeping problems, with frequent awakenings during night as well as early wake-ups. Sleep strengthens memory traces and can also promote mental restructuring, thereby inducing pivotal insights (Wagner et al., 2004). Alterations in sleep might thus influence cognition. Putative mediators include cytokines such as interleukin-6 (Vgontzas et al., 2003) and glucocorticoids. Recent data also suggest that increased activity in the hypothalamic pituitary-adrenal(HPA)axis can be animportant link to cognitivedys function after chronic stress. Glucocorticoid receptors are abundant both in the hippocampus and the prefrontal cortex, brain regions of crucial importance for cognition and mood (Cintra et al., 1994). It is of major interest that hyperactivity as well as decreased activity of the HPA axis has been associated with neuropsychatric symptoms in major depression and chronic fatigue/posttraumatic stress disorder, respectively (Gold et al., 2002; Yehuda, 2001). Immuneneuroendocrine variables would thus be of further interest to investigate in these patients.

We decided to enroll only women in this study to ensure a homogenous sample population; there is a clear overrepresentation of women in CBO. If similar cognitive dysfunctions are present in males with CBO remains to be studied.

5. Conclusion

In conclusion, specific cognitive impairments, in nonverbal memory and attention, seem to be present in patients with a diagnosis of CBO. These results are important to verify in larger samples. It is also a need for stringent classification of CBO in order to find possible links between underlying chronic stress and/or other predisposing factors. Explorations of possible neuroendocrine abnormalities as well as brain imaging may shed further light on the pathophysiology and putative treatment regimes in this disorder.

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