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SUBJECTIVE SYMPTOMS AND BREATHING PATTERN AT REST AND FOLLOWING HYPERVENTILATION IN ANXIETY AND SOMATOFORM DISORDERS

J. N. HAN,* K. STEGEN,† R. SCHEPERS,* O. VAN DEN BERGH† and K. P. VAN DE WOESTIJNE*

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Abstract—The purpose of the present study was to investigate the diagnostic specificity of bodily symptoms and respiratory behavior at rest and after a hyperventilation provocation test (HVPT) in patients that were either grouped according to the DSM classification or diagnosed as suffering from hyperventilation syndrome. Nine hundred three anxiety and somatoform patients, showing symptoms supposedly caused by psychogenic hyperventilation, and 170 healthy subjects, were studied. Breathing pattern and end-tidal CO_2 concentration were recorded during breathing at rest and following a HVPT. Subjective symptoms in daily life and after HVPT were measured. A principal-components analysis was performed on both the symptoms and breathing variables and their specificity levels were compared in the two classifications of patients. Some symptoms in daily life were grouped together with the same symptoms after the HVPT, other symptoms were not. This suggests that the HVPT elicited partly specific symptoms, and partly reproduced the symptoms experienced in daily life. Similar findings were observed with respect to the breathing variables. Patients with panic differed from other patients with anxiety disorders by an increased level of symptoms and a $FETCO_2$ decline at rest. The HVPT may be informative for diagnosis because it provokes some of the typical somatic and psychological symptoms, and it identifies the breathing instability that is characteristic of both patients with HVS and with anxiety. The same symptoms and breathing variables characterized the patients, whatever their classification. Overall, the specificity of breathing variables is rather low. © 1998 Elsevier Science Inc.

Keywords: Breathing pattern; End-tidal CO_2 concentration; Hyperventilation provocation test; Panic disorder.

INTRODUCTION

The diagnosis of hyperventilation syndrome (HVS) and of anxiety disorders is primarily clinical and based on the presence of a number of somatic and psychological symptoms, which cannot be explained by an organic disorder. The symptoms suggestive of HVS (Nijmegen Questionnaire) [1] and of anxiety disorders (specifically panic disorder, DSM-III-R) [2] are nearly identical. Whereas the DSM classification is merely descriptive, the diagnosis of HVS implies a judgment on causation of the symptoms. Therefore, additional requirements of a respiratory nature have been proposed for its diagnosis: (a) the symptoms should be reproduced in whole or in

*Laboratory of Pneumology, U.Z. Gasthuisberg, Leuven, Belgium.
†Department of Psychology, University of Leuven, Leuven, Belgium.
Address correspondence to: K. P. Van de Woestijne, U.Z. Gasthuisberg, Herestraat 49, B-3000 Leuven, Belgium. Fax: 0032-16-343-124.

part by voluntary hyperventilation producing hypocapnia (the so-called "hyperventilation provocation test," or HVPT) [3]; and (b) a delay in the recovery of end-tidal CO_2 concentration ($FETCO_2$) following the HVPT should occur [4, 5]. However, the specificity and validity of both the HVPT as a diagnostic tool and of delayed recovery have recently been challenged [6–8]. In addition, because ambulatory capnometry produced little specific evidence for the causal involvement of hypocapnia in the symptoms [7], the usefulness of the HVS as a diagnostic concept has been questioned. In addition, HVS should not be viewed as an explanatory alternative for panic disorder.

In a recent study comparing healthy subjects and patients with HVS and/or anxiety disorders, we suggested that the diagnostic value of ventilatory parameters and $FETCO_2$ improved when the features of breathing at rest and following HVPT were combined [9]. Indeed, the measurement context itself is often experienced as stressful, which may induce some of the typical respiratory and subjective responses in HVS patients during the baseline measurement [9]. Because the delayed recovery test takes baseline data as points of reference, its specificity for the diagnosis of HVS may be reduced. In addition, the usefulness of the HVS concept has been questioned because the subjective symptoms were not clearly linked with hypocapnia [7], but dysfunctional breathing may cause symptoms through mechanical processes as well [10]. Finally, other studies in our group have documented the role of occasional respiratory challenges as a source of learning of perceptual–cognitive processes, which eventually blur the relationship between hypocapnia and hypocapnia-related symptoms [11, 12]. All this suggests that neither the subjective recognition of the symptoms after the HVPT nor the presence or absence of hypocapnia during a typical bout of symptoms should be viewed as critical to judge the importance of respiratory abnormalities in HVS or anxiety disorders. Recent data have provided further evidence, at least for a hyperventilation subtype of panic [13].

In this study, we investigated a large number of patients, complaining of symptoms supposedly caused by regular hyperventilation. They were also grouped on the basis of DSM-III-R criteria into panic disorder, other anxiety disorders, and somatoform disorders. The symptoms and the breathing pattern and $FETCO_2$ at rest and following HVPT were compared with those of a group of healthy subjects. Principal components analysis was used to group the variables on the basis of their mutual correlations into a number of independent factors. One principal components analysis was carried out on the set of breathing variables at rest and after HVPT, and another one on the set of subjective symptoms in daily life and after HVPT. This type of analysis served three purposes:

1. Evaluation of the importance of the HVPT as a diagnostic tool. If, as a result of the analysis, symptoms during daily life are grouped with the same symptoms produced by the HVPT, it suggests that the daily-life symptoms can be reproduced by the HVPT and may be mediated by the same process. Conversely, if symptoms in daily life and the same symptoms following HVPT are grouped into different factors, it is likely that they are not linked by the same mechanism and, consequently, that their presence following HVPT cannot be used for diagnosis of these symptoms in daily life. Exploratorily, we also analyzed the breathing variables at rest and after the HVPT in the same way.