Hypothalamic-pituitary-adrenal stress axis function and the relationship with chronic widespread pain and its antecedents

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In clinic studies, altered hypothalamic-pituitary-adrenal (HPA) axis function has been associated with fibromyalgia, a syndrome characterised by chronic widespread body pain. These results may be explained by the associated high rates of psychological distress and somatisation. We address the hypothesis that the latter, rather than the pain, might explain the HPA results.

A population study ascertained pain and psychological status in subjects aged 25 to 65 years. Random samples were selected from the following three groups: satisfying criteria for chronic widespread pain; free of chronic widespread pain but with strong evidence of somatisation ('at risk'); and a reference group. HPA axis function was assessed from measuring early morning and evening salivary cortisol levels, and serum cortisol after physical (pain pressure threshold exam) and chemical (overnight 0.25 mg dexamethasone suppression test) stressors. The relationship between HPA function with pain and the various psychosocial scales assessed was modelled using appropriate regression analyses, adjusted for age and gender.

In all 131 persons with chronic widespread pain (participation rate 74%), 267 'at risk' (58%) and 56 controls (70%) were studied. Those in the chronic widespread pain and 'at risk' groups were, respectively, 3.1 (95% CI(1.3, 7.3)) and 1.8 (0.8, 4.0) times more likely to have a saliva cortisol score in the lowest third. None of the psychosocial factors measured were, however, associated with saliva cortisol scores. Further, those in the chronic widespread pain (1.9 (0.8, 4.7)) and 'at risk' (1.6 (0.7, 3.6)) groups were also more likely to have the highest serum cortisol scores. High post-stress serum cortisol was related to high levels of psychological distress ($p = 0.05$, 95% CI(0.02, 0.08)). After adjusting for levels of psychological distress, the association between chronic widespread pain and post-stress cortisol scores remained, albeit slightly attenuated.

This is the first population study to demonstrate that those with established, and those psychologically at risk of, chronic widespread pain demonstrate abnormalities of HPA axis function, which are more marked in the former group. Although some aspects of the altered function are related to the psychosocial factors measured, we conclude that the occurrence of HPA abnormality in persons with chronic widespread pain is not fully explained by the accompanying psychological stress.