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Cortisol levels in adult offspring of Holocaust survivors: relation to PTSD symptom severity in the parent and child

N Breslau

5–7 minutes

Introduction

The idea that there are individual differences in responses to stressful environmental events (e.g. Shalev and Yehuda, 1998) has constituted a pivotal advance in understanding how similar experiences can result in different psychopathological outcomes. That intergenerational effects may contribute to these inter-individual differences provides the relevant background for this study. Indeed we (Yehuda et al., 1998a) and others (Solomon et al., 1988) have demonstrated that adult children of Holocaust survivors have a greater prevalence of lifetime posttraumatic stress disorder (PTSD), as well as other types of psychopathologic outcomes, compared to demographically similar persons who have experienced equivalent types of Diagnostic and Statistics Manual-IV (DSM-IV) traumatic events. We further showed that PTSD in children of Holocaust survivors appeared to be strongly related to parental PTSD, but not to other parental psychiatric disorders

(Yehuda et al., 1998b). Based on these observations we have suggested that adult offspring of Holocaust survivors constitute an 'at risk' group for PTSD. These findings led us to initiate biologic investigations in adult children of Holocaust survivors, focusing primarily on putative biologic markers of risk for PTSD (Yehuda et al., 2000).

We recently reported that low 24-h urinary cortisol excretion in offspring was significantly associated with both lifetime PTSD and with parental PTSD, whereas having diagnosis of anxiety or depressive disorder was associated with relatively higher cortisol levels (Yehuda et al., 2000). We suggested that our findings might indicate the transgenerational transmission of stress response characteristics, similar to those that have been demonstrated in animal models of early handling (Liu et al., 1997, Caldji et al., 1998, Francis et al., 1999). Specifically, the early effects of maternal behavior in rat pups have recently been shown to persist across multiple generations (Francis et al., 1999), and to be associated with increased hippocampal glucocorticoid receptor expression similar to that proposed in PTSD (Yehuda et al., 1995).

In the present study, we reanalyzed recently published data (with the addition of four subjects since our previous publication) of mean urinary 24-h cortisol excretion in offspring of Holocaust survivors, in order to examine more closely the association between maternal and paternal PTSD and offspring cortisol levels. In the recently published study we defined offspring as having been raised by at least one biological parent who survived the Nazi Holocaust, and considered offspring to have the risk factor of parental PTSD if at least one parent met the diagnostic criteria for PTSD (Yehuda et al., 2000). However, we did not distinguish

whether the parental PTSD occurred in one or both parents, nor did we further assess specific associations of parental PTSD symptomatology to cortisol excretion in offspring.

In the current analyses we conducted a more detailed examination of the relationship between parental PTSD and cortisol excretion in the offspring. We divided the previous sample into three groups: those with no parental PTSD, offspring with maternal or paternal PTSD, and offspring with both maternal and paternal PTSD. In addition, we examined correlations between 24-h urinary cortisol excretion in offspring and severity of PTSD symptoms in parents and offspring.

Section snippets

Methods

The study was approved by the Institutional Review Board of the Mount Sinai School of Medicine. All subjects provided written informed consent prior to their participation. The sample consisted of 39 offspring (seven men and 32 women), and 15 healthy comparison subjects (eight men and seven women) between the ages of 26 and 61 years. Recruitment for the study was as previously described (Yehuda et al., 2000). Exclusion criteria for all subjects included significant current alcohol and/or

Sample characteristics

The offspring group was significantly older (offspring mean=41.62 yrs, SD=0.73; comparison mean=33.00 yrs, SD=7.92, $t(52)=3.64$, $P<0.001$) and had a higher proportion of females relative to

comparison subjects (χ^2=6.76, df=1, *P*<0.009). However, cortisol was not significantly correlated with age in this sample (Pearson's *r*=0.000; df=54; ns), and no difference in 24-h urinary cortisol levels was apparent for males vs. females (*t*(52)=0.76, ns). Therefore, neither age nor gender was controlled for in

Discussion

Several points are highlighted by the re-analyses of these data. First, with the addition of even a few subjects, the previous finding of an overall group difference between offspring of Holocaust survivors and demographically-similar controls in 24-h urinary cortisol excretion no longer reaches statistical significance. This is in large part due to the presence of depressive disorders, and associated higher cortisol levels, in three of the added subjects. In the prior paper, we reported a

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