Potential salivary biomarkers and their genetic effects in a pilot study of adolescent boys with externalising problems.

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Abstract

AIMS: Besides the well-known stress response marker cortisol, salivary alpha-amylase is receiving increasing attention. Numerous studies have investigated the potential biomarker properties of cortisol mirroring abnormal hypothalamic-pituitary-adrenal axis activity in connection to both internalising and externalising behaviour problems. The other major physiological system involved in stress reactivity, the sympathetic nervous system activity can be also measured by the surrogate marker of salivary alpha-amylase. Most of the studies applied a stressful situation to obtain inter-individual differences in stress reactivity, although differences in the baseline level of cortisol have been also shown in relation to externalising problems. To test the relevance of another (easier) biomarker, we selected to study baseline circadian salivary cortisol and alpha-amylase levels among adolescent boys with externalising problems.

METHODS: Saliva samples were collected at 3 time points (morning, noon, evening) during 3 consecutive days from 37 inpatient boys (mean age 12.4±1.0). Cortisol and alpha-amylase levels were measured by enzyme-linked immunosorbent and kinetic enzyme assays, respectively. Genetic variants in the hypothalamic-pituitary-adrenal axis and the norepinephrine transporter or catecholamine metabolising enzymes were tested for potential moderating effects at these salivary biomarkers.

RESULTS: Saliva cortisol showed the classical diurnal fluctuation in boys with externalising problems (possibly from a lower morning level), but it was not modified by the presence of either conduct, oppositional defiant or attention-deficit/hyperactivity disorder. The diurnal fluctuation of the salivary alpha-amylase levels was also typical, but the presence of conduct disorder was associated with the significantly lower alpha-amylase activity (p=0.024) among boys with externalising problems. The catechol-O-methyltransferase Val158Met (rs4680) polymorphism had an additional effect on salivary alpha-amylase: boys with homozygote genotypes had lower alpha-amylase activity at all 3 time-points compared to Val/Met heterozygotes (p=0.045).

CONCLUSIONS: Our preliminary data suggest that salivary alpha-amylase might be used to further characterise subgroups within externalising problems, however, this biomarker might be modified by certain genetic polymorphisms.