Heart rate variability (HRV) in kidney failure: measurement and consequences of reduced HRV

Sir,

Ranpuria et al., in a relevant review published recently [1], analysed decreased heart rate variability (HRV) as a potential risk factor for sudden cardiac death (SCD) in end-stage renal disease (ESRD) patients. Reduced HRV has been established as a significant independent risk factor of death in cardiovascular disease. HRV is decreased in haemodialysis patients, and despite a lack of clinical studies in this population, it is considered as a potential risk factor of SCD. Several other potential risk factors for SCD were also listed in this paper. In our opinion, one important SCD risk factor, i.e. elevated parathyroid hormone (PTH), is missing in this paper.

It was shown that elevated PTH is associated with increased risk of cardiovascular event and death, and should be treated as a cardiovascular risk factor [2]. More weight, PTH > 495 pg/ml was associated with significantly increased risk of SCD when compared with patients with PTH 91–197 pg/ml, in a large cohort of haemodialysis patients [3].

PTH is a very potent uraemic toxin that affects heart structure and function [4]. In respect to heart function for example, significant correlation was found between PTH and heart rate in HD patients [5]. Also parathyroidectomy led to a decrease in the heart rate in haemodialysis patients [6]. Elevated resting heart rate is a risk factor for all-cause and cardiovascular death in the general population [7].

Apart from the relationship between PTH and resting HR, it should also be emphasized that elevated PTH affects HRV in haemodialysis patients. Our studies may shed some light onto this issue. In frequency-domain analysis of HRV, it was found that total spectral power (TP) was significantly decreased in a group of HD patients with secondary hyperparathyroidism with PTH > 275 pg/ml when compared with patients with PTH < 275 pg/ml. In addition, significant negative correlation was found between PTH and TP, low-frequency band (LF) and high-frequency band (HF) of HRV, which reflect sympathovagal balance, sympathetic and parasympathetic autonomic nervous system tone [8], respectively. In another analysis, parameters obtained from time-domain analysis of HRV such as SDNN and SDANN were significantly lower in HD patients with left ventricular hypertrophy than in patients with normal left ventricular mass [9]. Also, significant negative correlation was found between SDNN and left ventricular mass index, a well-known cardiovascular risk factor in HD patients.

In conclusion, epidemiological studies identified a relationship between elevated PTH and cardiovascular mortality and sudden cardiac death. Further data suggest that PTH affects heart rhythm and heart rate variability, probably by influence on the autonomic nervous system. Further studies of the relationship between PTH and autonomic neuropathy in dialysis patients are necessary.

Editorial Note: Dr. Ranpuria et al. declined the opportunity to reply to this letter.

Conflict of interest statement. None declared.

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doi: 10.1093/ndt/gfn481