

Thesis Title	Comparison of Cardiovascular Autonomic Responses in Hypokalemia-related Patients and Normokalemic Subjects in Northeastern Thailand.
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Abstract

Potassium (K) deficiency is believed to have a key role in Sudden Unexplained Death Syndrome (SUDS or Lai Tai). SUDS incidence usually occurs during sleep at night, at the time when serum K level is normally at the lowest and there is a high variability in the autonomic response. The aims of the present study were 1) to compare the cardiovascular autonomic responses between patients with hypokalemia-related disorders and normokalemic subjects, and 2) to determine the influences of K on the cardiovascular autonomic responses.

Cardiovascular autonomic functions were compared in two groups of subjects: Patient group consisted of 18 hypokalemia-related patients, 12 suffering from Endemic distal renal tubular acidosis (EdRTA) and 6 from Hypokalemic periodic paralysis (HPP), age 25-59 years (mean = 43.61), 14 male and 4 female. Control group consisted of 18 normokalemic subjects, age 26-53 years (mean = 40.83), 12 male and 6 female. Fourteen patients were studied in two sessions, 6-12 months apart. Between the sessions, patients continued receiving K supplement and alkaline therapy as they had before (which may be irregular). Noninvasive cardiovascular reflex tests used were 1) Postural blood pressure change (PBP) reflecting vascular sympathetic activity; 2) Postural heart rate response (PHR); 3) Heart rate

variation in response to deep breathing (HR_{DB}); and 4) Valsalva maneuver (VR). The last three tests mainly reflect vagal activity, with deep breathing test being the most sensitive.

Result: There was no significant age difference between groups. Serum K level in the patients was significantly lower than that in the controls ($p < 0.05$), and the HR_{DB} in the patients was significantly diminished ($p < 0.05$). There was no significant difference in resting heart rate (RHR), PHR, VR, and PBP between the two groups. However, the patients' PHR was slightly lower and their VR tended to be higher than controls. Interestingly, the averaged pattern of heart rate response to postural change and Valsalva maneuver in patients tended to have a greater bradycardic response compared to those in control subjects. In addition, no abnormal EKG pattern was detected in the patients, and the atrioventricular conduction time was not different between the two groups. After 6-12 months, serum K level in the patients was slightly, but not significantly, increased, and there was no significant change in the cardiovascular autonomic responses.

The autonomic responses were influenced by age. The VR inversely correlated to age in both patient and control groups ($r = -0.74$ and $r = -0.66$, $p < 0.05$, respectively). In the patients, but not controls, HR_{DB} had a negative correlation with age ($r = -0.55$, $p < 0.05$). Serum K level, on the other hand, did not correlate with any test result of either group, except VR in patients only ($r = -0.53$, $p < 0.05$).

The present study showed that hypokalemia-related patients had diminished cardiac vagal activity when compared with the controls. Possible decrease in cardiac sympathetic and increase in vascular sympathetic responses in the patients were also suggested. It was proposed that the defects could be explained by the possible change in membrane properties of the cardiac and nerve terminal membranes due to chronic potassium deficiency and/or hypokalemia.