Relation between Plasma Aldosterone Concentration and Renal Handling of Sodium and Potassium in Alcoholics during the Withdrawal Phase

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Dear Sir,

We were very interested in the article by Hené et al. [1] about the relation between plasma aldosterone concentration (PAC) and renal handling of sodium and potassium. These authors suggested that the determination of the ratio between excreted potassium (U_K) and the distal sodium delivery ($UNa+K$) and its relations to PAC, plasma renin activity (PRA) and serum potassium level is very useful for the analysis of disorders of potassium metabolism. It is clear that sodium intake, by its effects on PRA and urinary sodium excretion, is a major determinant of relations between any of these terms and PAC. On the other hand, potassium intake affects aldosterone secretion independently of sodium intake. It follows that PAC is commonly studied in relation to both urinary sodium and potassium excretion expressed as UNa/U_K ratio. The use of the ratio $U_K/UNa+K$ has the theoretical advantage of taking into account the fact that sodium delivery itself has a strong influence on potassium excretion. Potassium excretion is thought to be secondary to sodium reabsorption and therefore highly dependent on the amount of sodium delivered to the excretion site, the ratio $U_K/UNa+K$ probably reflects the contribution of aldosterone to potassium excretion. Hené et al. [1] investigated the relationship between $U_K/UNa+K$ and PRA or PAC in normal volunteers and in various groups of patients with primary and secondary hyperaldosteronism, renal insufficiency and essential hypertension treated with chlortalidone or spironolactone. We report here our experience in alcoholism, another condition affecting potassium homeostasis in which we analyzed the relationship between sodium-potassium exchange, PAC, PRA and serum potassium level. We studied 40 hospitalized withdrawing patients with a history of alcohol abuse from 10 years or more with a daily alcohol intake exceeding 160 g of ethanol/day during the last 6 months.

Only patients without evidence of chronic liver disease and with creatinine clearance within the normal limits were included in the study. None of them was suffering of diarrhea or vomiting, nobody had respiratory or metabolic alkalosis.

PAC, PRA, serum concentration and 24-hour urinary excretion of sodium (UNa) and potassium (U_K) were measured during the first days of hospitalization in the phase of alcohol withdrawal. 19 patients (48%) showed a slight or moderate hypokalemia (mean 3.7 mEq/l; SD 0.3). PAC correlated with $U_K/UNa+K$ ($r = 0.515$, $p = 0.0011$), UNa ($r = 0.435$, $p = 0.0075$) and UNa/U_K ratio ($r = -0.495$, $p = 0.0016$). Slightly weaker correlations were found between PRA and $U_K/UNa+K$ ($r = 0.423$, $p = 0.007$), UNa ($r = -0.335$, $p = 0.034$) and UNa/U_K ($r = -0.349$, $p =$

0.028). We could not find any correlation between U_K and PRA or PAC. Serum potassium level correlated weakly with PAC ($r = -0.287$, $p = 0.07$) and showed no relationship with PRA. In a previous study [2] we observed that during the phase of alcohol withdrawal there is a reduction in sodium and water excretion. The sodium retention could be due to sodium depletion occurring during the period of regular alcohol intake and arising from the alcohol-induced diuresis as was suggested by Bannan et al. [3]. In good agreement with these results our present findings can be interpreted as providing suggestive evidence that during the alcohol withdrawal phase, as a consequence of negative sodium balance, there is a stimulation of the renin-angiotensin-aldosterone system. The increased sodium-potassium exchange, induced by the high levels of PRA and PAC, may be a necessary adaptive mechanism to maintain sodium balance. The dual relationship of $U_K/UNa+K$ with both PRA and PAC makes it difficult to analyze the respective roles of aldosterone and renin in renal sodium-potassium exchange. $U_K/UNa+K$ correlated somewhat better with PAC than did UNa/U_K but more

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data are needed to establish the superiority of $U_K/UNa+K$ in these patients. Finally our results confirm the validity of the approach suggested by Hené et al. [1] for the analysis of the conditions affecting potassium homeostasis. The determination of the $U_K/UNa+K$ ratio and its relation to PAC, PRA and serum potassium level is very useful for the study of disorders of potassium metabolism in withdrawing alcoholic patients. It confirms the physio-pathological significance of the renin-angiotensin-aldosterone system in regulating the renal handling of sodium and potassium in this phase of the alcoholic disease.

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References

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