



DETERMINATION OF RISKFACTORS AND CLINICAL OUTCOMES OF HYPERKALEMIA IN ELDERLY

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OBJECTIVES

World Health Organization reports that elderly population grows faster compared to other age groups and in 2025 there will be a total of 1.2 billion persons aged over 60 years (1). It is also estimated that by 2050, there will be 2 billion elderly and 80% of this population will be living in developing countries. As elderly population is growing rapidly in the whole world, it is essential to understand their health problems for providing appropriate health care.

In all the stages of aging defined by gerontologists (young old: 65-74 years, middle old: 75-84 years, oldest old: >85 years), functional reserve capacity was diminished in multiple organ systems (2). Elderly population is susceptible to electrolyte disorders like potassium imbalance due to the physiologic changes. Hyperkalemia is accepted as a life-threatening electrolyte disorder (3). We performed this study to determine the risk of hyperkalemia, related factors and clinical outcomes in young-middle-oldest old patients.

METHODS

Patients (aged ≥65 years) admitted to our hospital between 1/01/2014 and 31/12/2014 were screened and the patients with hyperkalemia (serum potassium >5.5 mEq/L) were evaluated. Those without exclusion criteria's were included in the study. The patients were grouped according to their age; Group 1 (young old) consisted of patients aged between 65 and 74 years, Group 2 (middle old) aged between 75 and 84 years, Group 3 (oldest old) aged 85 years and older, and Group 4 (control group) consisted of patients aged over 65 years and with normal serum potassium levels (3.5-5.5 mEq/L). Length of hospital stay and mortality rates of the patients with hyperkalemia were recorded. Relation between serum potassium level and hospital expenses (US dollars), number of comorbid diseases, and mortality rates were evaluated. We also investigated whether drugs like nonsteroidal anti-inflammatory drugs (NSAIDs), angiotensin converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB), spironolactone, sex and number of comorbid diseases are risk factors for the development of hyperkalemia.

RESULTS

Of the 40092 patients aged ≥65 years admitted to our clinic, hyperkalemia was detected in 1180 patients. Prevalence of hyperkalemia was 2.94%. There were 249 patients fulfilling all inclusion criteria and these were included in the study. Serum potassium levels (mEq/L) were found to be 5.96±0.28, 6.79±0.30, 7.70±0.32, 4.40±0.55 (p<0.001), mortality rates (%) 30.1, 53.3, 65.8, 5.3 (p<0.05), duration of hospitalization (days) 6.21±4.2, 9.36±2.8, 13.55±3.6, 5.93±2.4 (p<0.001), hospital expenses (US dollars) 482.6±311.1, 821.68±312.1, 1050.67±224.5, 322.2±114.7 (p<0.001) for groups 1, 2, 3, and 4 respectively. There was positive correlation between serum potassium level and number of comorbid diseases, length of hospital stay, all cause of mortality (p<0.001). It was found that the oldest old patients were taking more drugs compared to middle and young old patients, which may cause hyperkalemia (p<0.001). Risk factors for hyperkalemia were the use of NSAIDs (OR 2.679; 95% CI:2.304-3.115), spironolactone (OR 2.530; 95% CI:2.134-3.000), and ACEI (OR 2.242; 95% CI:1.975-2.975), ARB (OR 2.679; 95% CI:2.304-3.115), having ≥2 comorbid diseases (OR 2.221; 95% CI:2,104-3,162), female gender (OR 2.112; 95% CI:2.432-3.012), and renal injury (OR 5.55; 95 % CI:4.192-7.348). Hyperkalemia risk was found to be increased 30.03 times when any of ACEI, ARB, NSAIDs or spironolactone is given to a patient with renal injury (95 % CI:21.598-166.863).

DISCUSSION

Although there are studies about hyperkalemia in general population, to the best of our knowledge, this is the first study carried out to investigate risk and related factors of community acquired hyperkalemia in the elderly. Functional and anatomical changes in aged kidneys make elderly susceptible to electrolyte abnormalities like hyperkalemia. In this study, we found that hyperkalemia causes increase in mortality and morbidity rates. Frequency and severity of hyperkalemia in elderly may be associated with underlying renal dysfunction, number of comorbidities and use of medications causing hyperkalemia. With increasing age, structural and functional changes, which may cause potassium imbalance, may arise. Reduction in GFR and tubular transport functions may cause reductions in potassium excretion. However, remaining nephrons will try to compensate this. In the presence of medications associated with hyperkalemia or in the presence of risk factors like underlying renal disease, risk of hyperkalemia is increased in elderly patients compared to younger patients (4). In our study, although positive relation was obtained between the age and serum potassium level, age was not found as an independent risk factor for hyperkalemia. Our results suggested that hospitalization and mortality rates were higher in study groups compared to control group and hyperkalemia was related with mortality and hospitalization rate. Also, hospitalization and mortality rates were higher in oldest old patients compared to middle and young old patients. Positive correlation was present between duration of hospitalization and serum potassium values in oldest, middle and young old patients.

CONCLUSIONS

Elderly patients are susceptible to hyperkalemia. Increased number of comorbid diseases cause polypharmacy and eventually hyperkalemia in elderly patients, especially in very old patients. Hyperkalemia is more common in oldest old patients compared to middle and young old patients and it is also more common in middle old patients in compared to young old patients. Drugs like NSAIDs, ACEI, ARB, and spironolactone are risk factors for hyperkalemia in elderly patients, especially in patients with kidney diseases. Increased serum potassium level is related to increased mortality, morbidity and hospital expenses. Thus they should be prescribed more carefully.

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