BRIEF OBSERVATION

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Summer Syncope Syndrome Redux

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ABSTRACT

BACKGROUND: While antihypertensive therapy is known to reduce the risk for heart failure, myocardial infarction, and stroke, it can often cause orthostatic hypotension and syncope, especially in the setting of polypharmacy and possibly, a hot and dry climate. The objective of the present study was to investigate whether the results of our prior study involving continued use of antihypertensive drugs at the same dosage in the summer as in the winter months for patients living in the Sonoran desert resulted in an increase in syncopal episodes during the hot summer months.

METHODS: All hypertensive patients who were treated with medications and admitted with International Classification of Diseases, 9th Revision code diagnosis of syncope were included. This is a 3-year retrospective chart review study. They were defined as "cases" if they presented during the summer months (May to September) and "controls" if they presented during the winter months (November to March). The primary outcome measure was the presence of clinical dehydration. The statistical significance was determined using the 2-sided Fisher's exact test.

RESULTS: A total of 834 patients with an International Classification of Diseases, 9th Revision code diagnosis of syncope were screened: 477 in the summer months and 357 in the winter months. In patients taking antihypertensive medications, there was a significantly higher number of cases of syncope secondary to dehydration during the summer months (40.5%) compared with the winter months (29%) ($P = .04$). No difference was observed in the type of antihypertensive medication used and syncope rate. The number of antihypertensives used did not increase the cases of syncope in either summer or winter.

CONCLUSIONS: An increased number of syncope events was observed in the summer months among people who reside in a dry desert climate and who are taking antihypertensive medications. The data confirm our earlier observations that demonstrated a greater number of cases of syncope among people who reside in a dry desert climate who were taking antihypertensive medications during summer months. We recommend judicious reduction of antihypertensive therapy in patients residing in a hot and dry climate, particularly during the summer months.

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KEYWORDS: Heat syncope; Hypertension; Summer; Summer syncope

Syncope, defined as a transient lapse of consciousness due to loss of postural tone, is a common presenting illness and is estimated to result in roughly 740,000 annual Emergency Department visits and 460,000 inpatient admissions, and over $2.4 billion in health care expenditure per year.[1] Orthostatic hypotension, accounting for 24% of cases in one series,[2] itself has numerous causes—of special interest, particularly in the elderly, are dehydration and medication

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side effects. And while antihypertensive therapy is known to reduce the risk for heart failure, myocardial infarction, and stroke,[3] it can often cause orthostatic hypotension and syncope,[4] especially in the setting of polypharmacy and possibly, a hot and dry climate.[5,6] Associations between orthostatic hypotension syncope and age and diuretic use have been described in the literature,[7,8] but associations with high ambient temperatures have not yet been demonstrated.[9] The objective of the present study was to investigate whether the results of our prior study involving continued use of antihypertensive drugs at the same dosage in the summer as in the winter months for patients living in the Sonoran desert resulted in an increase in syncopal episodes during the hot summer months.

CLINICAL SIGNIFICANCE

- An increased number of syncope events were observed in the summer months among people who reside in a dry desert climate and who were taking antihypertensive medications, compared with winter months.
- We recommend judicious reduction of antihypertensive therapy in patients residing in a hot and dry climate, particularly during the summer months.

MATERIALS AND METHODS

This study is an extension of our prior brief observational retrospective study entitled "Summer Syncope Syndrome."[5] This is an institutional review board-approved retrospective study performed at the University of Arizona, South Campus in Tucson, Arizona for a total length of 3 years. All hypertensive patients treated with medications who were admitted with an International Classification of Diseases, 9th Revision code diagnosis of syncope during the study duration were included. They were defined as "cases" if they presented in summer months (May to September) and "controls" if they presented during winter months (November to March). Our primary outcome measure was the presence of dehydration, as defined by clinical examination, frank hypotension with systolic blood pressure <100, orthostatic hypotension, and blood urea nitrogen/creatinine ratio >20. All other causes of hypotension were excluded from the study. Data were analyzed using Stata IC/13.1 (StataCorp LP, College Station, TX). Numerical variables are expressed as mean $\pm$ SD. Univariate comparisons between syncope patients on antihypertensive medications in summer and winter months were done using proportion test, χ^2 test, or Fisher's exact test for categorical data. All statistical testing was 2-tailed with significance level set at alpha of $\leq .05$.

RESULTS

A total of 834 patients—477 in the summer months and 357 in the winter months—with the International Classification of Diseases, 9th Revision code diagnosis of syncope were screened. A total of 163 patients (34%) of 477 enrolled in the summer months had a history of hypertension and were receiving antihypertensive medications, as well as 128 similar patients (36%) of 357 during the winter months. In patients taking antihypertensives, there was a significantly greater number of cases of syncope secondary to dehydration during the summer months (40.5%) compared with the winter months (29%) ($P = .04$) (**Figure**). Among the 66 patients that were enrolled during the summer months that met our dehydration criteria, 41% were males and 59% females. Of those 66 patients, 73% of the patients were age 60 years and older. Among the 37 patients that were enrolled during the winter that met our dehydration criteria, 57% were males and 43% females. From those 37 patients, 68% of the patients were age 60 years and older.

The type and number of antihypertensive medications used by enrolled patients were also analyzed. The most common antihypertensive medication used by both summer and winter groups of patients were angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (71% of summer patients and 70% of winter patients) and beta-blockers (50% of summer patients and 43% of winter patients). An equal number of patients were on calcium channel blockers (35% of summer patients and 43% of winter patients) and diuretics (38% of summer patients and 46% of winter patients). For the summer patients that were enrolled, 35% were on one antihypertensive medication, 29% on 2, 24% on 3, and 7% on 4, respectively. For the winter patients that were enrolled, 38% were on one antihypertensive, 27% on 2, 24% on 3, and 8% on 4, respectively.

DISCUSSION

The present study is an extension of our previously published summer syncope brief observation, with the study period extended from 1 year to 3 years. The data confirm our earlier observations that demonstrated a greater number of cases of syncope among people who reside in a dry desert climate who are taking antihypertensive medications during summer months. Patients age 60 years and above seem to be the most vulnerable for developing syncope. No definitive association was found between rate of syncopal episodes and a specific class of antihypertensive medication, although we have a very small sample of patients. The majority of patients were on 1-3 antihypertensive medications, and this did not vary significantly in the summer as compared with winter months.

Not surprisingly, the results again support low systemic blood pressure as a predictor of syncope in the desert climate of Tucson in individuals receiving antihypertensive medications.

A key improvement of the current investigation is an extension of the study period from 1 year to 3 years.