512

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IS NOCTURIA ASSOCIATED WITH SALT INTAKE?

Hypothesis / aims of study

Nocturia is a bothersome symptom in lower urinary tract symptom. It is reported that lifestyle-related diseases, such as hypertension, diabetes mellitus, could influence nocturia in recent days. Japanese people in their lives consume more salt than most other countries people. We therefore examined the relationships between salt intake and nocturia or other factors.

Study design, materials and methods

We recruited 167 patients at our hospital who complained of nocturia. We measured sodium and creatinine levels in spot urine specimens and calculated daily estimated salt intake (g/day) according to age, height, and body weight [1]. Frequency-volume chart (FVC) and International Prostatic Symptom Score (IPSS) were collected, and patients' sleep quality was evaluated using Pittsburgh Sleep Quality Index (PSQI). Past histories of hypertension, diabetes, hyperlipidemia, and other lifestyle-related diseases were noted. Blood pressure and heart rate were recorded, and blood samples were collected for evaluation of estimated glomerular filtration rate (eGFR,ml/min/1.73m^2).

Results

Night-time frequency was not associated with salt intake (correlation coefficient (r)=−0.005, P=0.951) (Graph 1,Table 1). We also showed the associations between salt intake and FVC parameters including bladder capacity, nocturnal polyuria index, 24-hour voided volume, and PSQI global score (Table 1). Salt intake was negatively associated with nocturnal polyuria (P<0.05), but its r value was relatively low (r=−0.184). None of the indivisual IPSS results were associated with salt intake. According to multiple regression analysis, night-time frequency was also not associated with salt intake (Table 2). Age was independently associated with night-time frequency.

However, in stratified analysis, night-time frequency was positively associated with salt intake in case of heart rate≥80 beats per minute (r=0.314, P=0.032) (Graph 2). There was also a tendency towards a correlation in female aged≥75 years (r=0.325, P=0.140) (Graph 3).

Interpretation of results

Nocturia is considered to have multiple etiology and to be especially associated with lifestyle diseases, including so-called metabolic syndrome. We therefore hypothesized daily salt intake was associated with nocturia. However, our result was that unexpectedly night-time frequency was not associated with salt intake according to either simple or multiple regression.

In contrast, among the patients with a higher than average heart rate, we found a positive association between salt intake and night-time frequency. This result suggests that salt intake may activate the sympathetic nervous system, leading to an increased heart rate and possibly causing nocturia. In female aged over 75 years, there was also a tendency towards a positive association between salt intake and night-time frequency. Although exact mechanisms of these observations are unclear, there may be the association between salt intake and nocturia in specific groups of patients. Further studies are needed to seek out such patients who may benefit from interventions.

There were several limitations in our study. First, the number of patients was relatively small. Secondly, salt intake was only evaluated once, and the accuracy may have been improved if salt intake had been assessed on two or three occasions. Third, nocturia was the chief complaint in all the patients, and the inclusion of patients with other symptoms may have allowed an association between salt intake and nocturia to be detected.

Concluding message

Our results indicate that nocturia is not associated with salt intake among nocturia patients overall. However, there might be a relationship in specific groups of patients, such as those with a higher heart rate or elderly female.

Graph 1: Association between night-time frequency and salt intake

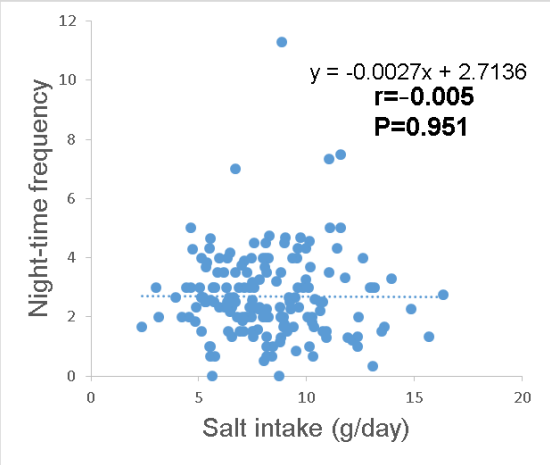


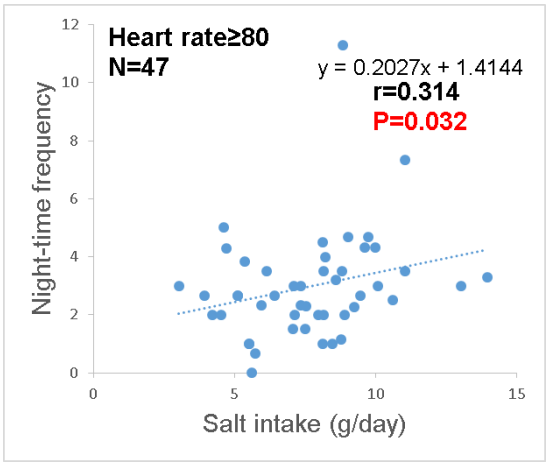
Table 1: Associations between salt intake and FVC parameters

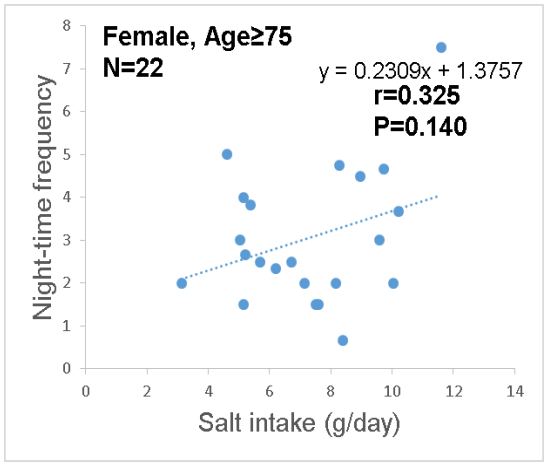
	Mean±SD	r	P
Salt intake (g/day)	**8.23±2.58**		
Night-time frequency	2.69±1.45	-0.005	0.951
Bladder capacity (ml/kg)	5.29±2.08	-0.070	0.370
Nocturnal polyuria index (%)	44.4±12.9	-0.184	0.018
24h voided volume (ml/kg)	28.0±9.96	-0.094	0.227
PSQI global score	9.49±4.03	-0.129	0.100

Table 2: Multiple regression analysis of night-time frequency as dependent variable

Dependent variable: Night-time frequency						
	Simple regression			Multiple regression		
		β or r	P	β	95%CI	P
All patients	167					
Sex	male: 125	0.009	0.212	0.073	-0.446–0.591	0.782
Age	73.8	0.274	0.000	0.052	0.023–0.081	0.000
BMI	23.1	-0.036	0.651	-0.009	-0.080–0.062	0.809
Diabetes	42/25.1%	-0.052	0.504	-0.209	-0.736–0.319	0.436
Hypertension	104/62.3%	-0.090	0.250	0.077	-0.456–0.610	0.775
Hyperlipidemia	54/32.3%	-0.039	0.620	0.077	-0.438–0.543	0.833
eGFR	60.7	0.003	0.969	0.005	-0.009–0.019	0.487
Salt intake	8.23	-0.005	0.951	-0.005	-0.099–0.090	0.922

Graph 2 (lower left): Stratified analysis in patients with a heart rate≥80 bpm
Graph 3 (lower right): Stratified analysis in female aged≥75 years





References

1. Tanaka T,J Hum Hypertens,16(2),97-,2002

Disclosures

Funding: none **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** we performed observational study as an ordinary medical care, and there was no harm to patients. **Helsinki:** Yes **Informed Consent:** Yes