

LENGTH OF STAY AT URBAN COASTAL AND SODIUM INTAKE IN THE ELDERLY PARTICIPATING IN HEALTH CARE PROGRAM

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Abstract

Hypertension (HT) is the most common and preventable risk factor for cardiovascular disease in the worldwide. Risk factors for HT include the age, high intake of sodium, and low intake of potassium, as well as the geographical location of a region. Recent studies revealed that communities dwelling in coastal area have a high risk of HT relating to high exposure of salty foods. This study was aimed to analyze the correlation between the length of stay and the sodium intake in elderly at urban coastal communities in Indonesia. Sodium intake was measured by 24-h single urinary while the association was assessed by spearman at a significance level of 5%. The subjects were 51 postmenopausal women aged ≥ 45 years old participating in health care program. The result demonstrated 37.3% subjects were classified as hypertensive. Almost all subjects have been living in the coastal area since birth, so the mean of residence was almost similar to the mean age (52.8 ± 12.57) years. It indicated a significant inversely correlation between the length of stay and the sodium intake ($r = -0.37$, $p = 0.007$), but insignificant correlation between the length of stay and the blood pressure. Length of stay in coastal located at urban cities is associated with low sodium intake. Participating in health care program, our subjects have the awareness on the harmful effects of excessive salt consumption which allegedly causes their limited salt consumption. The high prevalence of HT among the elderly may be caused by hormonal problem rather than the length of stay and the sodium intake.

Keywords: length of stay, sodium intake, urban coastal, health care program

Presenting Author's Biography



Farapti. Graduated from Faculty of Medicine, Universitas Airlangga as general practitioner on January 2007, I continued my master degree in clinical nutrition, Faculty of Medicine, Universitas Indonesia in 2011. As lecturer in Department Nutrition, Faculty of Public Health since 2008, my interest in nutrition, dietetics, and metabolism, and also sport nutrition. My tesis about the effect of coconut water on blood pressure, encourage me to further understand about sodium and potassium intake in population.

INTRODUCTION

Cardiovascular disease (CVD) affects approximately 15.2% of the elderly population Indonesia and become the second of major health problems affects the elderly health, after bone and joint disease [1]. Cardiovascular disease is a major public health burden worldwide,

and hypertension (HT) is the key modifiable risk factor. The prevalence is predicted to increase around 60% by the year of 2025 [2].

Risk factors for hypertension include age, high intake of sodium, and low intake of potassium, as well as the geographical location of a region such as coastal areas [3,4,5]. The elderly have a high risk to HT due to hormonal problem; the previous study showed the prevalence of hypertension is higher in postmenopausal women than in premenopausal women [6]. Moreover, Indonesia is an archipelagic country with high prevalence of HT, and many communities reside in coastal region. Communities dwelling in coastal area have a high risk of HT. A study carried out by Rina [7] showed that the proportion of HT in the coastal/fishing resident is higher than those in farming resident, which one factor associated with HT is salt intake. The high amount of salt used for salting fish can increase the salt intake in these populations and have an undesirable effect on blood pressure [3,4,5,7].

Salt intake and blood pressure may be closely related. Epidemiological studies provided evidence for a detrimental effect of sodium intake on blood pressure (BP) among both hypertensive and normotensive individuals [8,9]. This relationship was discovered a long time ago, and population studies have shown a lower incidence of hypertension and cardiovascular outcomes in people who have a lower salt intake. Moreover, sodium consumption contributes to the increase in blood pressure observed with increasing age [8,9,10].

The measurement of 24-h urinary sodium excretion is considered the ‘gold standard’ method for obtaining data of these intakes in population surveys since it reflects ~ 97 % of Na consumed [11]. Moreover, the problems of underestimation or overestimate of these intakes based on dietary surveys were reported in most studies [12]. There are limited data on sodium intake in Indonesia assessed using 24 hour urine collection and evaluated the association between the length of stay and the sodium intake among the elderly women in urban coastal dwellers.

METHODS

Participants

The participants came from community-dwelling urban coastal in Kenjeran beach Surabaya. Fifty one subjects who met the study criteria were obtained from 135 subjects who followed the screening stage. The participants were the elderly women aged ≥ 45 years old. Almost of the elderly in urban coastal in Kenjeran Surabaya followed program of community health care facilitated by government of Surabaya district. We recruited only female because most of (88%) participants who actively engaged in the community health care in that place were female. Participants were involved in the study if they were in postmenopause period, permanent resident in coastal area for more than 10 years, and willing to collect 24-h urine sample. Participants with cognitive impairment (mini mental state examination (MMSE) score < 24), kidney dysfunction (creatinine clearance test (CCT) < 60 mL/min), consuming tobacco and alcohol, and inaccurate urine collection were excluded.

Study Measurements

Data collection in this study included structure questionnaire, blood pressure, anthropometric data, and a 24-h single urine sample. A structured questionnaire on age, length of stay, physical activity current health status, medical and hypertension history, and consumption of medication and hypertension drug use were fulfilled by participants.

Sodium intake was obtained from 24-h urinary excretion. All participants were given plastic bottles completed with written and verbal instructions for a single 24-hour urine collection. Completeness of collection was determined by the subjects' records, 24-hour urinary volume <500 mL, and the output of creatinine in the 24 hr urine specimens. Analysis for sodium was determined by ion-selective electrodes and reported by mmol/24h. The normal range urinary Na based on Price and Wilson was 100-260 mmol, so we grouped participants based on the classification. [13]

Statistical Analysis

All data were checked for normality using the Kolmogorov smirnov test. Bivariate analysis to assess correlation between the length of stay and the sodium intake was performed by Pearson or Spearman test. All statistical calculations were performed with Statistical Package for Social Science (SPSS) version 21.

RESULT

A total of 51 subjects completed the study. Their average age was 56.98 ± 5.7 years old with a BMI of 25.96 ± 4.85 kg/m². Almost all subjects lived in the coastal area since birth, so the mean residence was almost similar to the mean age (52.8 ± 12.57) years old. Of the 51 subjects with BP measurements, 19 subjects (37.3%) were classified as hypertensive. The mean \pm SD urinary Na of all subjects was 104.75 ± 59.25 mmol/d. General characteristics are summarized in Table 1.

Table 1. General characteristics of subjects (n=51)

Variable	'n' and percentage (%)
Age (year), mean \pm SD	56.98 \pm 5,7
Length of stay (year) mean \pm SD	52.8 \pm 12.57
Body mass index (kg/m ²), mean \pm SD	25.96 \pm 4.85
underweight	2 (3.9%)
Normal	25 (49%)
overweight	16 (31.4%)
Obesities	8 (15.7%)
Physical activity	41 (80.4%)
low	10 (19.6%)
moderate	
Education level	34 (66.7%)
Elementary school	12 (23.5%)
Junior high school	5 (9.8%)
Senior high school	0
College education	
Job	33 (64.7%)
Working	18 (35.3%)
Not working	132.25 \pm 17.78
Systolic Blood Pressure (mm Hg)	83.63 \pm 10.3
Diastolic Blood Pressure (mm Hg)	32 (62.7%)
Normotension	19 (37.3%)
Hypertension	15 (29.4%)

Use of antihypertensive drugs	104.75±59.25
Urinary Na (mmol/d)	32 (62.7%)
< 100	18 (35.3%)
100-260 mg	1 (2%)
>260	

The analysis of bivariate correlation using spearman test demonstrated the length of stay at urban coastal was inversely associated with the sodium intake in the elderly at urban coastal. Meanwhile both the length of stay and the sodium intake were insignificantly associated with blood pressure (Table 2)

Table 2. Association between length of stay, natrium urine, and blood pressure

Variable	Mean ± SD	Length of stay		SBP	DBP
		r	p		
Age	56.98±5,7	0.81	<0.001*	0.291	0.363
Length of stay	52.8±12.57	-		0.333	0.265
Urinary Na	104.75±59.25	-0,37	0.007*	0.713	0.41
Urinary K	20.52±9.72	-0.19	0.189	0.195	0.283

* significant, p<0,05

DISCUSSION

This is the first study evaluated the association between the length of stay and the sodium intake in the elderly women in urban coastal. It also the first study uses 24-hour urinary to measure sodium intake in health community in Indonesia. Recent study showed among all countries in Southeast Asia until 2013, only Singapore used the gold standard 24-h urinary Na excretion to estimate intakes [14].

The main finding in this cross sectional study was the length of stay at urban coastal was inversely associated with sodium intake in the elderly at urban coastal. We observed the role of geographic region by including only subjects' residence permanently in coastal area for more than 10 years. Further analysis showed both length of stay and sodium intake were not associated with blood pressure (Table 2). These findings opposite the report by the previous studies who revealed that coastal dweller consumed high salt and caused the high prevalence of HT in coastal area [3,4,5,7]

The mean of sodium intake based on 24-h urinary excretion in our subjects was 104.75±59.25 mmol/d or 2409.14± 190.82 mg/d (Table 2). Since Na adequacy based on Indonesian recommended dietary allowance (RDA) for older women is 1200-1500 mg/d and the upper limit of Na intake is 2300 mg/d [13]. We found that majority of subjects (62.7%) had low Na intake (< 100 mmol/d). It is somewhat surprising that the mean of sodium intake in coastal area was categorized as low level. These averages were considerably lower than those reported in many Asian and Western populations. Most adult populations have the mean Na intakes >100 mmol/day, and for many Asian countries the mean intakes are >200 mmol/day [8]. Intersalt study [10] in the 10,079 individual participants aged 25 to 55 years old both within centers and in ecological analyses across the study's 52 centers located in 32 countries reported with a daily sodium excretion ranged from 0-2 mmol (Yanomamo Indians, Brazil) to 242 mmol (north China).

Low sodium intake in our study was similar to Iseki et al [16] that Na excretion was lower in the elderly than in adults, but the mean of Na excretion in screened subjects in Okinawa was 176 mEq/day for women, which still higher than our subjects. The very low Na intake is generally in undeveloped societies that do not have access to salt [17]. Some countries from epidemiological studies demonstrated that low Na intake presented in women aged > 50 years old [9] and moreover the previous study presented that subjects in the low sodium group had lower educational background. Another reason for the low sodium excretion might be due to the low energy intakes [17]. Overall, our subjects showed women aged over than 45 years old, all of them had low education, and average energy intakes was approximately 71.32 %±12.46 of the Indonesian RDA.

Coastal area in our study was located in urban central city so the accessibility of health information and health care could be achieved easily, and the subjects have followed program of community health care for five years. Recent study in rural coastal in Indonesia revealed the proportion of HT by 40.4% was higher than our study; it was likely caused by accessibility to health care is so far [7]. Our study involved the elderly participating actively in health care program. Health providers held these program every week by giving health education and supplementary feeding. Participating in health care program, the raising of awareness on the harmful effects of excessive salt consumption especially for blood pressure effect, may cause our subjects limit their salt consumption. Our subjects may change their behavior by decreasing of salt intake on their food. Yim study revealed a nutrition education program for the hypertensive elderly women to reduce the salt intake might effectively decrease blood pressure and salt intake. It also improves nutrition knowledge, dietary behavior, and finally adherence to a recommendable low-sodium diet [18].

The prevalence of HT was still high in our study may be caused by hormonal problem rather than length of stay and sodium intake. The hormonal decline among elderly that is characteristic of the menopause is considered in conjunction with the associated blood pressure gain [6]. In elderly women, the multiple mechanisms may mediate the elevated blood pressure, including activation of the renal sympathetic nervous system and renin angiotensin system [19]

CONCLUSION

It can be concluded that the length of stay is not related with the sodium intake in urban coastal dwellers. Furthermore, the length of stay at urban coastal is inversely associated with the sodium intake in the elderly. Participating in health care program, our subjects raised the awareness on the harmful effects of excessive salt consumption as they may limit their salt consumption. However, there was no recorded data regarding with the reason of the subjects in applying low Na intake, whether because of the effect of health education or as their habitual intake. A further research is encouraged to understand those reasons. The prevalence of HT is still high in the elderly in coastal areas, thus, further investigation on the hormonal role in pathogenesis HT related to Na intake is required.

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