EFFECTS OF SODIUM INTAKE ON SLEEP QUALITY WITH UNCONTROLLED HYPERTENSION PATIENTS IN RURAL CHIANG RAI PROVINCE, NORTHERN THAILAND

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ABSTRACT:

Background: Sodium intake was associated with an increasing in blood pressure level. Meanwhile, the duration of sleeping either short sleep (< 7 hours) or long sleep (> 8 hours) are positively associated with the risk factors such as obesity, diabetes, hypertension and cardiovascular disease. Hence, this research was to study the effects of sodium intake from the sauce and seasoning powder to the sleep quality in uncontrolled hypertension patients who live in rural Chiang Rai province of Northern Thailand.

Methods: A cross-sectional survey study was conducted on 198 patients (aged ≥18 years old) both male and female who were diagnosed with uncontrolled hypertension and registered in Ta Khao Pleuk Health Promotion Hospital, Mae Chan district, Chiang Rai province. The data was collected by using the structured interview questionnaire.

Results: The results showed significantly differences in smoking behavior, drinking alcohol, and a family history of high blood pressure between male and female patients ($P < 0.05$). When compared the differences between sleep quality and related factors, it was found that there was statistically significant difference among male & female ($P < 0.05$). According to the logistic regression analysis, when controlled the following factors: sex, age, frequency of treatment, Co-morbid disease such as hypertension, diabetes, heart disease, and others, the result showed that patients who consumed sodium sauces could lead to the decreased hours in their sleeping.

Conclusions: The sodium intakes from sauce and seasoning powder by the uncontrolled hypertension patients could lead to the decreased hours in their sleeping.

Keywords: Sodium intake; Sleep quality; Uncontrolled hypertension, Thailand

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INTRODUCTION

Chronic disease is a major cause of death worldwide [1]. In 2005, cardiovascular disease was considered the cause of 30 percent death compared to infectious disease, malnutrition and perinatal death [2]. The increasing of blood pressure level and hypertension were the risk factors of coronary heart disease and incidence of stroke [3]. The situation of hypertension has increased steadily especially among the adults (≥25 years old); and it is the major cause of the death from heart disease and stroke [4].

Sodium intake was associated with an increasing in blood pressure level [5]. In the same way, reducing sodium intake can decrease blood pressure level [6, 7]. Similar research by Brown et al. [7] showed that a salt intake around the world, implications for public health, indicated that high amount of sodium in the diet is a major cause of increased high blood pressure. In The Unites States,

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Table 1 The socio-demographic data of uncontrolled hypertension patients

Variables	N	Percentage
Sex		
Male	75	37.9
Female	123	62.1
Age (years)		
≤ 44	13	6.6
45 - 64	122	61.6
≥ 65	63	31.8
Status		
Single	3	1.5
Marriage	156	78.8
widow	37	18.7
divorce	2	1.0
Occupation		
Agriculture	106	53.5
Trade	9	4.5
Contractors	10	5.1
Official	2	1.0
Unemployed	71	35.9
Education		
No education degree	54	27.3
Primary school	130	65.7
Secondary school	9	4.5
Bachelor degree	5	2.5
Income		
Adequate for saving	87	44.0
Inadequate for saving	105	53.0
Inadequate	6	3.0

the American consumed sodium on the average of 9 to 12 gm per day [7]. Other studies suggested that high sodium intake is a major risk factor for heart disease and stroke [8, 9]. The systematic reviewed by Strazzululo et al. [10] which collected data from 13 studies with 177,000 participants revealed that high sodium intake was associated with increasing risk of stroke.

About 50 percent of all patients with essential hypertension have obstructive sleep apnea (OSA), and another 40 percent of essential hypertension patients are habitual snorers but without OSA. There is now convincing evidence that both OSA and habitual snoring are independent risk factors for essential hypertension, furthermore, treatment of OSA will reduce the blood pressure [11]. In addition, the duration of sleeping either short sleep (< 7 hours) or long sleep (> 8 hours) is positively associated with the risk factor such as obesity, diabetes, hypertension and cardiovascular disease [12].

In Thailand, Chanamanee et al. [13] conducted a study on sleep quality and its related factors among university students in southern part of Thailand using the Pittsburgh Sleep Quality Index (PSQI); and it found that 76.3 percent had poor sleep quality. According to their result, students who have poor sleep habits, perceptions of poor health and high stress tended to have poor quality sleep as well. Therefore, the main objective of this study was to investigate the effects of salt intake on the sauce and seasoning powder to sleep quality in patients with uncontrolled hypertension patients.

MATERIAL AND METHOD

A cross-sectional survey study was conducted on 198 patients (aged ≥18 years old) both male and female who were diagnosed with uncontrolled hypertension and registered in Ta Khao Pleuk Health Promotion Hospital, Mae Chan district, Chiang Rai province (Data from Ta Khao Pleuk Health Promotion Hospital, Mae Chan district, Chiang Rai province, 2013). All participants must be able to communicate in Thai or local language; and they must be willing to participate in the study. The data was collected by the structured interview questionnaire. The questionnaire had 3 parts. The first part was on socio-demographic data; the second

Table 2 Comparison of health risk factors between male and female

Characteristics	Male(75)	Female(123)	$\chi 2$	*p*-value
Co-morbidity				
Sick	41	60	0.64	0.42
Not sick	34	63		
Smoke				
Never smoke	30	107	50.67	0.00**
Have been smoked	28	6		
Smoking	17	10		
Drink				
Does not drink	20	91	47.12	0.00 **
Have been drink	25	7		
Drinking	30	25		
Exercise status				
Rarely	13	23	0.18	0.91
<30 minutes 5 times/week	20	35		
>30 minutes 5 times/week	42	65		
Family health history of hypertension				
None	35	35	6.78	0.03 **
Not sure	4	8		
Yes	36	80		
Add sauce				
No	19	31	0.09	0.95
1-2 meals a day	19	29		
Every meal	37	63		
Add seasoning powder				
No	24	31	1.88	0.38
1-2 meals a day.	5	14		
Every meal	46	78		

* *p* - value < 0.05, ** *p* - value < 0.01 Person Chi - square

Table 3 Comparison of the difference between sleep quality and related factors

Variables		Sleep behavior		$\chi 2$	*p*-value
		Good sleep	Bad sleep		
Sex	Male	44	31	3.64	0.04*
	Female	55	68		
Add sauce	Use	29	21	1.71	0.13
	Not use	70	78		
Add seasoning powder	Use	30	25	0.63	0.26
	Not use	69	74		
Co-morbidity	No	47	54	0.99	0.19
	Yes	52	45		
Treatment	Not always	42	21	12.03	0.00**
	Always	57	78		

* *p* - value < 0.05, ** *p* - value < 0.01 Chi - square

was on risk factors related to cardiovascular disease; and the third part was Pittsburgh Sleep Quality Index (PSQI) [14].

All statistical analyses were performed using SPSS for Windows 17 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics including frequencies and percentage were applied to analyze socio-demographic. Chi-square was used to compare the health risk factors and the differences between sleep quality and related factors between male and female. Cox & Snell R square was used to analyze association between risk factors and sleep quality.

This study was approved by the Committee of Research Ethic in Public Health, The Graduate School, Chiang Mai University (approval code: 014/2012, date: 4 December 2012).

Table 4 Association between cardiovascular risk factors with sleep quality in uncontrolled hypertension patients

Variables	B	S.E.	Sig.	Exp. (B)	95% CI (Exp.B)
Sex	0.826	0.344	0.16	2.284	1.165 – 4.481
Add sauce 1-2 meals a day	-1.595	0419	0.000**	0.203	0.089 – 0.461
Age	-0.026	0.015	0.091	0.975	0.946 – 1.004
Add seasoning powder every meals	-0.721	0.360	0.045*	0.486	0.240 – 0.985
Do not take sleeping pills	-1.122	0.371	0.002**	0.326	0.057 – 0.673
Not feel sleepy	-0.528	0.321	0.101	0.590	0.314 – 1.108
Constant	3.162	1.079	0.003	23.621	

a. Variable (s) entered on step1 : Gender, Add sauce 1-2 meals a day, Age, Add seasoning powder every meals, Do not take sleeping pills, Not feel sleepy

2 Log likelihood = 239.79; Cox and Snell R Square = 0.16; Model X^2 = 34.696 D.F. = 6 Sig: 0.00

Table 5 Behavior to use sauce, seasoning powder, and probability of good quality sleep

Cooking food with sodium chloride		Probability of good quality sleep (%)
Add sauce	Add seasoning powder	
Not add	Not add	70
Not add	Add	53
Add	Not add	31
Add	Add	19

Model X^2 = 17.20 D.F. = 3 Sig: 0.00

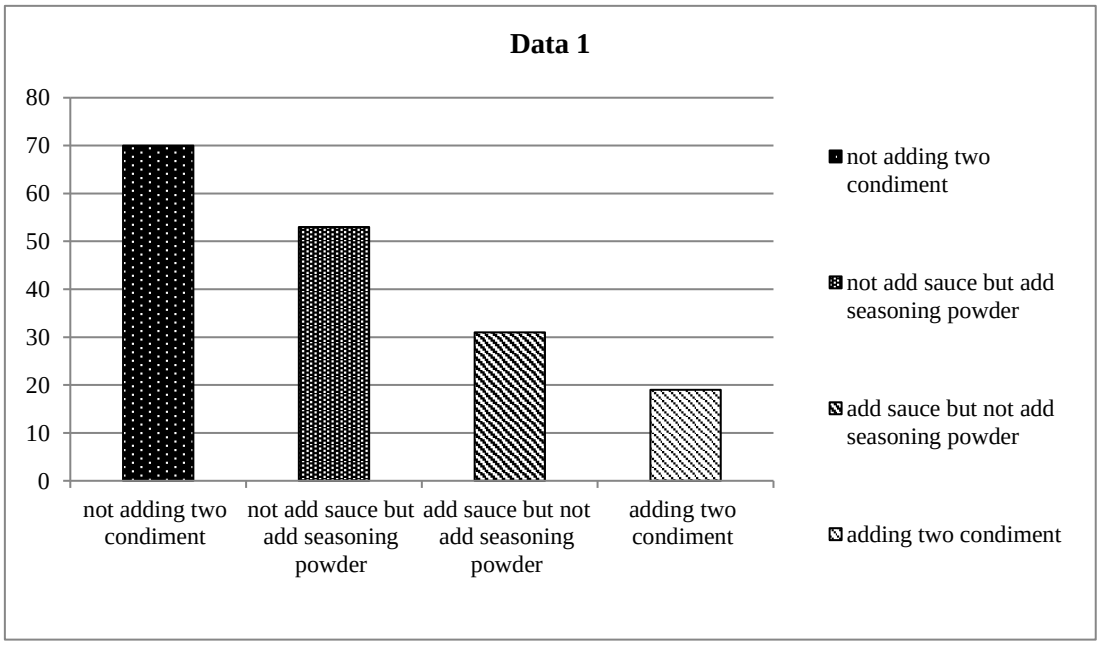

Figure 1 The probability of good quality sleep according to the data from Table 5

RESULTS

The socio-demographic information showed that most uncontrolled hypertension patients were female (62.1%), age 45-64 years (61.6%), with marital status (78.8%), primary school education (65.7%), agriculture career (53.5%), and low income (53%), Table 1.

The comparison of health risk factors between male and female (Table 2) showed that smoking behavior, drinking alcohol, and the history of high blood pressure in family members were significantly differences (*P > 0.05*).

The comparison results of the differences between sleep quality and related factors (Table 3) indicated the differences among sex and medication (treatment) 0.05 (*P> 0.05*).

The results from analyzing the relationship between factors which contributed to cardiovascular disease and the quality of sleep revealed the decrease of sleep quality approximately 80 percent in the group of sodium intake from sauce and 51 percent in the seasoning powder group. Therefore, sodium chloride from sauce and seasoning powder negatively affected to the sleep quality of uncontrolled patients (Table 4).

In addition, it has also been found that the quality of sleep of the participants who did not take any sauce or seasoning powder were higher (70% of good quality sleep) than those who had taken both sources of sodium chloride (19% of good quality sleep) (Table 5 and Figure 1).

DISCUSSION

The results from comparison of health risk factors between male and female in uncontrolled hypertension patients at Ta Khao Pleuk Health Promotion Hospital, Mae Chan district, Chiang Rai province, demonstrated that smoking and alcohol consumption behaviors were significantly different at the $P < 0.01$; and family history of the hypertension was also significantly different at the $P < 0.05$). These were consistent with the findings by Lumley et al [15] who reported that male had a family history of the cardiovascular disease more than female; and preference of smoke behavior in male was also more than female.

When comparing the difference between sleep quality and related factors, it was found that there were significantly differences in sex and medication (treatment) $(P < 0.05)$. This result were similar to the study by Fiorentini et al. [14] which reported that the prevalence of hypertension was 87.1 percent in the patients group who had poor sleep quality compared to 35.1 percent in the patient group who had good sleep quality ($p < 0.0001$). Furthermore, this study revealed that respiratory disorders during sleep period and sleep quality, assessed by PSQI significantly, showed association with diabetes and hypertension.

The results from this study on the relationship between factors contributing to cardiovascular disease being compared to the quality of sleep in uncontrolled hypertension patients by controlling factors (sex, age, consuming drugs regularly) and hypertension, diabetes, heart disease, etc., were similar to the findings by Puavilaiby, et al. [16], which it found that the high blood pressure was associated with consuming dietary salt, drinking alcoholic and smoking. On the other hand, when the sample had sour test of food, the result showed that this could prevent hypertension, because high potassium in the sour test could decrease systolic pressure. Moreover, the study by He and MacGregor [9] showed that there were various evidences confirmed that salt consumption was a major cause of increased blood pressure.

CONCLUSION

This study suggests that in order for uncontrolled hypertension patients to get better sleep, they must refrain from the use of seasoning powder or sauce as these were a major source of sodium chloride daily consumption that clearly lend the negative effect towards the patients' sleep quality.

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