PUBLIC HEALTH RESEARCH

The Association of Knowledge, Attitude and Practice with 24 Hours Urinary Sodium Excretion among Malay Healthcare Staff in Malaysia

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ABSTRACT

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Introduction The most effective and affordable public health strategy to prevent hypertension, stroke and renal disease is by reducing daily salt consumption. Therefore, this study aims to determine the association of knowledge, attitude and practice on salt diet intake and to identify foods contributing to high sodium intake.

Methods Secondary data analysis was performed on MySalt 2016 data. It was conducted from November 2015 until January 2016 which involving Ministry of Health Staff worked at 16 study sites in Malaysia. Salt intake was measured using 24 hours urinary sodium excretion. Food frequency questionnaire was used to determine the sodium sources. Knowledge, attitude and practice of salt intake were assessed using a validated questionnaire adapted from WHO. Demographic data and anthropometric measures also were collected. Sodium levels of more than 2400mg/day was categorised as high sodium intake. Data were analysed using SPSS software version 21.

Results The mean sodium intake estimated by 24 hours urinary sodium excretion was 2853.23 $\pm$ 1275.8 mg/day. Food groups namely rice/noodles (33.8%), sauces/seasoning (20.6%), meat and poultry (12.6%) and fish/seafoods (9.3%) were the major contributors of dietary sodium. In multiple logistic regression analysis, being a male (aOR=2.83, 95% CI 2.02 – 3.96) and obese (aOR=6.78, 95% CI 1.98 – 23.18) were significantly associated with high urinary sodium excretions. In addition, those who were unsure that high salt intake can cause hypertension (aOR=1.24, 95% CI 0.65 – 2.36), those who think that they consumed too much salt (aOR=2.10, 95% CI 1.13 – 3.87) and those who only use salt rather than other spices for cooking (aOR=2.07, 95% CI 1.29 – 3.30) were significantly associated with high urinary sodium excretion.

Conclusions This study showed that the main sources of sodium among Malay healthcare staff is cooked food. Poor knowledge and practice towards reducing salt consumption among them contributes to the high sodium consumption. The practice of healthy eating among them together with continuous awareness campaign is essential in order to educate them to minimize sodium consumption and to practice healthy eating.

Keywords Knowledge - Attitude - Practice - Food group - Dietary sodium - Urinary sodium excretion

INTRODUCTION

Hypertension is an important public health problem, thus, identifying the modifiable risk factor is essential to curtail this problem. As in Malaysia, the prevalence of hypertension is on the rise with 50% increment over 20 years, in which greater increment were among undiagnosed hypertension[1]. In addition, Malay ethnicity has the highest prevalence of undiagnosed hypertension as compared to other ethnicities in Malaysia. Similarly, numerous local studies also revealed that the prevalence of hypertension among Malays was the highest.[2, 3] Thus comprehensive intervention targeted at Malay ethnicity is crucial in order to reduce their risk of developing hypertension and to reduce further complications from the disease.

Various studies had shown that high salt diet has been known as the leading cause of the development of non-communicable disease particularly cardiovascular diseases.[4-6] Hence, reducing salt intake in the community has becoming a major determinant and strategy to prevent hypertension as well as to decrease the risk of stroke, heart and renal diseases[7]. Salt is easily available in the market as it is being used as nutrient and flavour enhancer, food preservative and texture enhancer for example in making dough.[8] Hence, it is available in the meat and fish products, rice and noodles, dairy products, sauces, confectionary and pickles.[9] As for Asian countries like Malaysia, most of the salt come from sodium that is added in cooking and from sauces such as soy sauce and chili sauce.[10] On average, total salt intake was about 9.5g/d for men compared to 8.1g/d for women as what had been suggested from the survey in UK.[7] Data published by Food Standard Agency suggested that overall average value of salt intake was 8.6g/day.[11] For Malaysia, the dietary trends for salt intake is estimated at least 8.5 to 10 g/day, which is found highest among the Malay ethnicity.[12-13]

Various factors can determine the level of salt intake among the populations. Culture and socioeconomic were the known factors that determine the behaviour of salt consumption.[14-15] Individual's knowledge, attitude and practice were thought to influence the salt intake which is amendable to change, fortunately.[16] Therefore, the objective of this study is to determine the associations between knowledge, attitude and practice on sodium intake among Malays healthcare staff in Malaysia. This study also will identify major food groups which contribute to the dietary sodium intake among them. For this purpose, a sub-analysis was conducted among the Malay healthcare staff because to conduct a study at population level will consume more cost. The information gains will provides evidence about the dietary lifestyles and habits among Malays. This information is necessary in order to provide a baseline for monitoring purpose and also for the development of new strategies and promotional activities at the national level that enables effective public education initiatives development.

METHODS

A secondary data analysis was performed on MySalt 2016 study data which was conducted from November 2015 until January 2016.[17] It involved 16 study sites in Malaysia; 14 state health departments, research institute and Headquarters of Ministry of Health Malaysia, Putrajaya. Based on the study by Rashidah et al.,[13] the largest sample size calculated was 770 with $\alpha = 0.05$ and power of study 80%. The eligibility criteria included: Malay ethnicity who worked at selected study sites minimum 1 year duration; age 18 to 60 years old and able to read and understand a consent form and complete the survey instruments. Those suffering from chronic debilitating diseases such as stroke, cardiac infarction, severe liver and renal diseases and other malignancies were excluded in this study. Those who were taking hypertensive medication, hormone therapy or hypoglycemic agents were excluded too.

Sodium intake was assessed using two methods which were 24 hours urinary sodium excretion and dietary assessment using food frequency questionnaires (FFQs). A single 24-hour urine collection was obtained from each respondent. The respondents were requested to discard the first urine of the day and all urine for the following 24 hours were collected using urine collection bag. The last collection should be the first urine that the respondents pass on the start of the second day.[18] The respondents were asked to record time of start and finish of the 24 hour urine collection and whether they have missed any collection during the 24 hour period. Urinary collections were considered complete when the urine volume $\geq$ 500 ml and reported length of collection over 20 hours[18]. The collapsible urine bags were collected at the selected study sites by private laboratory staff. Subsequently, the urine was analyzed using ion selective electrodes diluted for sodium in Architect C, System Analyzer in one centre at Shah Alam in order to ensure the consistency of the results.

A self-administered FFQs were given to the respondents and reviewed by the nutritionist for the accuracy. The FFQs contain 102 high sodium food items categorized into 11 food groups. They are 1) meat/poultry products; 2) fish/seafoods; 3) eggs; 4) spreads; 5) 'kuih muih' or desserts; 6) snacks; 7) sauces/seasoning; 8) fast foods; 9) cooked foods (grain products); 10) cooked food (others) and 11) canned foods. In this FFQs, respondents filled in the number of food servings taken in day/week/month for the past one month. The estimated sodium intake was then calculated

by multiplying the sodium content per serving to the number of servings taken on a day basis. Information regarding individual demographic characteristics were collected based on pretested and structured questionnaires which also include their medical and medication history. Knowledge, attitude and practice of salt intake were assessed using a validated questionnaire adapted from WHO.[19] Anthropometric measures such as body weight, height, waist circumference were performed according to standard protocols. Male respondent with waist circumference 90cm and more; and female respondents with waist circumference 80cm were classify as high.[20] For body mass index (BMI), the classification follow as set by WHO which were 1) BMI < 18.5 is underweight, 2) BMI 18.5 – 24.9 is normal weight, 3) 25.0 – 29.9 is overweight and 4) BMI >30.0 is obese.[21] The blood pressure was measured according to the standard method using an auscultatory blood pressure technique.

Analyses were performed using SPSS, version 21.0. P value < 0.05 was considered statistically significant. All variables were tested for normality using the Kolmogorov-Smirnov test and variables with skewed distribution were reported as median and quartiles. The relative contributions of food groups to the sodium intake in diet were expressed as percentages. Bivariable analysis were conducted to identify associations between knowledge, attitude, practice and other variables with the 24 hours urinary sodium excretion. Sodium levels of more than 2400mg/day were categorized as high 24 hours urinary sodium excretion.[21] Multiple logistic regression analyses were used to evaluate urinary sodium excretion against the knowledge, attitude and practice by inclusion variables displaying significant correlations with 24 hours urinary sodium excretion by a backward logistic regression.

RESULTS

A total of 793 respondents were involved in this study. Basic characteristics of respondents are indicated in table 1. The mean age of the respondents was 37 ± 8.96 years. Almost two thirds (61%) of the respondents were pre-obese and obese. Only small percentage (14.2%) of the respondents had abnormal blood pressure.

Table 1 Socioedomography Profile, Anthropometry and Blood Pressure Measurement of the Respondents

Characteristics	Frequency (%)
Age (years)	37.0 ± 8.96[a]
20-39	528 (66.6)
40-59	265 (33.4)
Sex	
Male	309 (39.0)
Female	484 (61.0)
Marital Status	
Single	143 (18.1)
Married	650 (81.9)
Educational Status	
Secondary and below	181 (22.8)
Form 6/ Diploma	329 (41.5)
Degree and above	283 (35.7)
Monthly Income (RM)	3200 (2101.42, 4983.65)[b]
RM 1999.99 or less	153 (19.3)
RM 2000- RM 3999.99	342 (43.1)
RM 4000- RM 5999.99	170 (21.4)
RM6000 or more	128 (16.1)
Waist Circumference (cm)	86.5 ± 12.06[a]
Normal	337 (42.5)
High	456 (57.5)
Body Mass Index (kg/m^2)	26.9 ± 5.14[a]
Underweight	18 (2.3)
Normal	284 (35.8)
Pre-Obese	294 (37.1)
Obese	197 (24.8)
Systolic Blood Pressure (mmHg)	121.5 (16.12)[a]
Diastolic Blood Pressure (mmHg)	76.9 (9.93)[a]

[a] Mean ± standard deviation, [b] Median (25th and 75th percentile)

The mean urinary sodium excretion and dietary records estimated for sodium intake were 2853.3 ± 1257.81 mg/day and 2901.4 ± 1651.1 mg/day respectively (Table 2). According to the estimates of urinary salt excretion, 27% of overall excretion met the WHO target of <5g salt/d and 47% met the Malaysian CPG Hypertension of <6 g salt/d.

Table 2 Dietary Sodium Intake and Urinary Sodium Excretion

Characteristics	24 hours urinary sodium excretion	Dietary Sodium Intake
Mean (SD) (mg/d)	2853.3 (1257.8)	2901.4 (1651.1)
Median (mg/d)	2711.6	2515.2
25^{th} , 75^{th} Percentile	1942.9 , 3631.6	1650.0 , 3812.1
WHO Recommendation <5g/d		
Overall	27.0%	35.8%
Male	15.5%	32.7%
Female	34.3%	37.8%
Malaysian Recommendation <6g/d		
Overall	47.0%	41.7%
Male	27.5%	45.0%
Female	50.8%	48.3%

Figure 1 indicates the percentage of the estimated sodium consumption from diet (non-discretionary salt). Of the 11 groups, cooked food (grain product), sauces/seasoning, meat/poultry products and fish/seafoods were the major sources of sodium intake among the respondents.

Figure 1 Percentage of Sodium Consumptions according to Food Groups

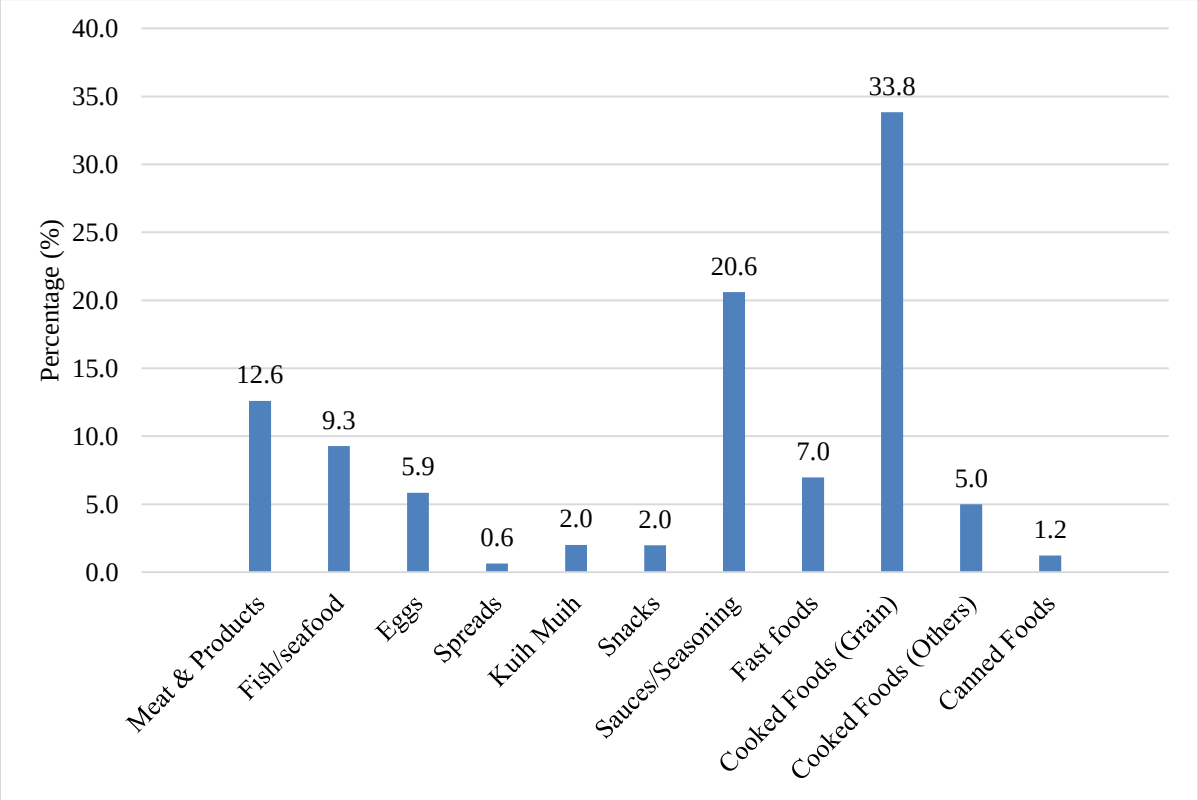

Table 3 showed the 24 hours urinary sodium excretion according to sociodeomographic profiles. Male respondents, those who are married, those who have high waist circumference and obese significantly had higher 24 hours urinary sodium excretion. Meanwhile, those who are not sure high salt diet can cause hypertension; those who think they consumed too much salt; those who

do not take regular action to control salt; those who ignore the salt label content during purchasing; those who add salt on the table; those who did not buy low salt alternative; and those who only use salt rather than other spices in cooking were significantly had higher 24 hours urinary sodium excretion. Details are shown in Table 4.

Table 3 Twenty four hours urinary sodium excretion according to sociodemographic profile

Variables	24 Hour Urinary Sodium Excretion		X^2 value	p-value
	Normal (%)	High[a] (%)		
Overall	331 (41.7)	462 (58.3)		
Sex				
Male	85 (27.5)	224 (72.5)	42.170	<0.001*
Female	246 (50.8)	238 (49.2)		
Age				
20-39 years	224 (42.4)	304 (57.6)	0.304	0.581
40-59 years	107 (40.4)	158 (59.6)		
Marital Status				
Single	72 (50.3)	71 (49.7)	5.318	0.021*
Married	259 (39.8)	391 (60.2)		
Educational Status				
Secondary and below	67 (37.0)	114 (63.0)	2.849	0.241
Form 6/ Diploma	147 (44.7)	182 (55.3)		
Degree and above	117 (41.3)	166 (58.7)		
Monthly Income				
< RM 2000	64 (41.8)	89 (58.2)	3.549	0.314
RM 2000- < RM 4000	149 (43.6)	193 (56.4)		
RM 4000- < RM 6000	74 (43.5)	96 (56.5)		
≥ RM6000	44 (34.4)	84 (65.6)		
Waist Circumference				
Normal	161 (47.8)	176 (52.2)	8.775	0.003*
High	170 (37.3)	286 (62.7)		
Body Mass Index				
Underweight	14 (77.8)	4 (22.2)	18.131	<0.001*
Normal	134 (47.2)	150 (52.8)		
Pre-Obese	115 (39.1)	179 (60.9)		
Obese	68 (34.5)	129 (65.5)		

High[a] = > 2400 mg/day, *significant at $p < 0.05$

Table 4 Twenty four hours urine sodium excretion and its association with knowledge, attitude, practice on Salt Diet

Variables	24 Hour Urinary Sodium Excretion			
	Normal (%)	High[a] (%)	X^2 value	p-value
KNOWLEDGE				
High salt diet can cause health problem				
Yes	315 (42.6)	424 (57.4)	3.495	0.062
No	16 (29.6)	38 (70.4)		
High salt diet can cause hypertension				
Yes	257 (38.2)	415 (61.8)	61.999	<0.001*
No	58 (86.6)	9 (13.4)		
Unsure	16 (29.6)	38 (70.4)		
ATTITUDE				
How important to you is lowering salt in your diet?				
Very Important	233 (43.4)	304 (56.6)	2.153[b]	0.341
Important	95 (38.6)	151 (61.4)		
Not Important	3 (30.0)	7 (70.0)		
How much salt do you think you consume?				
Little	42 (45.2)	51 (54.8)	8.386	0.039*
Right amount	192 (45.3)	232 (54.7)		
Too much	42 (32.3)	88 (67.7)		

Don't know	55 (37.7)	91 (62.3)		
PRACTICE				
Take regular action to control salt intake				
Yes	213 (45.7)	253 (54.3)	7.317	0.007*
No	118 (36.1)	209 (63.9)		
Regular action taken to control salt intake				
1) Avoid/ minimize processed foods				
Yes	126 (45.5)	151 (54.5)	2.458	0.117
No	205 (39.7)	311 (60.3)		
2) Read the salt labels				
Yes	63 (54.8)	52 (45.2)	9.409	0.002*
No	268 (39.5)	410 (60.5)		
3) Do not add salt on the table				
Yes	153 (47.8)	167 (52.2)	8.135	0.004*
No	178 (37.6)	295 (62.4)		
4) Buy low salt alternatives foods				
Yes	85 (53.1)	75 (46.9)	10.684	0.001*
No	246 (38.9)	387 (61.1)		
5) Do not add salt when cooking				
Yes	38 (48.7)	40 (51.3)	1.732	0.188
No	293 (41.0)	422 (59.0)		
6) Use spices other than salt when cooking				
Yes	58 (59.2)	40 (40.8)	13.991	<0.001*
No	273 (39.3)	422 (60.7)		

High[a] = > 2400 mg/day, [b]Continuity correction *significant at $p < 0.05$

A multiple logistic regression analysis was conducted for all the significant variable as shown in Table 5. The model had -2 Likelihood ratio of 934.543 and Nagelkerk R square of 0.222. Compared to female respondents, male respondents were 2.8 times more likely to have high urinary sodium excretions. Those who are obese also were 6 times more likely to have high urinary sodium excretions compared to those who are underweight. In addition, those who are unsure that high salt intake can cause hypertension and those who think that they consumed too much salt were associated with high urinary sodium excretions. Meanwhile, respondents who did not use spices for salt replacement when cooking were 2 times more likely to have high urinary sodium excretion.

Table 5 Multiple Logistic Regression to Predict High Urinary Sodium Excretion

Variables	AOR[a]	95% CI	X^2 Stat (df)[b]	p-value
Gender				
Male	2.83	2.020 – 3.965	36.554 (1)	<0.001*
Female	1.00			
Marital Status				
Married	1.47	0.982 – 2.212	3.504 (1)	0.061
Single	1.00			
Body Mass Index			12.817 (3)	0.05*
Obese	6.78	1.981 – 23.176	9.299 (1)[c]	0.002*
Pre-Obese	4.83	1.434 – 16.285	6.460 (1)[c]	0.011*
Normal	4.06	1.434 – 13.728	5.138 (1)[c]	0.023*
Underweight	1.00			
Knowledge				
High salt diet can cause hypertension			40.264 (2)	<0.001*
Unsure	1.24	0.646 – 2.362	39.256 (1)[c]	<0.001*
No	0.09	0.044 – 0.195	0.409 (1)[c]	0.522
Yes	1.00			
Attitude				
How much salt do you think you consume?			10.671 (3)	0.014*
Don't know	0.97	0.542 – 1.749	0.008 (1)[c]	0.998
Too much	2.10	1.134 – 3.869	5.576 (1)[c]	0.018*
Right amount	1.01	0.607 – 1.644	0.001 (1)[c]	0.928
Little	1.00			

Practice				
Use spices other than salt when cooking				
No	2.07	1.294 – 3.301	9.239 (1)	0.002*
Yes	1.00			

[a]Adjusted Odds Ration, [b]Likelihood Ratio test, [c]Wald test, CI = Confidence Interval
Multicollinearity and interactions were checked and not found.
Hosmer-Lemeshow test (p=0.449), classification overall percentage 68.7% and -2 Log likelihood
The daily mean was 934.543 were applied to check model fitness.

DISCUSSION

Sodium intake in this study was 2853mg/day or 7.1g/day; which is 800mg/day above the recommendation by WHO.[19] Thus, salt intake among the Malay ethnicity is very high. However, in Malaysia setting, the data on salt intake varied. The current sodium intake was lower compared to a previous study among normotensive health care staff in Malaysia in the year 2012 (3429mg/day).[13] Comparing with the population from other countries, this finding was found to be lower.[22-24] Furthermore this study also revealed that sodium excretion was significantly higher among male, similarly as reported by others.[15, 24]

The source of food the respondents obtained could be a reason for excessive salt intake. The current economic situation requires people to spend more time at the workplace, causing them to have limited time to prepare meals at home and subsequently increase the possibility of eating outside.[25] The amount of sodium consumption were increasing substantially due to change in lifestyle from the practice of home meal to outside meal.[13] It was supported from a study where outside cooked food yielded the highest amount of sodium. It also has becoming a nature to add salt on the table so that the food will taste better.[26] The most worrying part is high dietary salt intake can contribute to numerous health conditions after it begins to build up in the body.[27] It presents a major challenge to the kidneys to excrete large amount of salt. High salt intake subsequently predispose to high blood pressure due to its adverse effects on vulnerable cardiovascular system.[28] In addition, sedentary lifestyle and excessive sodium intake make people to be more vulnerable to high blood pressure.[29]

This study found that dietary sodium intake was higher compared to the urinary sodium excretion. A previous researcher has stated that only 86% to 95% sodium will be excreted in the urine. The other balance will be excreted through sweat and feces probably because of exercise and high climate temperature.[30] Therefore, sodium will be excreted lesser than the sodium intake. There could be possibilities where the respondents may eat less than usual or less then required maintaining body weight prior to urine collection and leads to under consumption.[31]

The advantage of food frequency questionnaire is it can be used as a marker for comparison since it estimates sodium consumption for the past 7 days, including weekend. It is more likely to represent patient's habitual dietary pattern. It has been widely used for measurement of nutritional intake in various cases and believed to have good reliability.[32-33] Most foods contain different proportions of nutrients, it may cause benefits to health or it can be predisposing factors to a disease.[34] Looking in depth, sodium has its own added value as a good nutrient for human health, however, when added into food for home-cooking or used as table salt simultaneously can cause harm to human health when they are consumed excessively.[35]

Low salt, very low salt and salt-free foods are foods with a concentration of sodium up to 120 mg/100 g, 40 mg/100 g and 5 mg/100 g, respectively as defined by the Malaysian Food Regulations 1985 and Food Act 1983.[36] Meanwhile, Malaysian Dietary Guidelines 2010 has indicated moderate and high salt foods contained 120-480mg/100g and more than 480mg/100g, respectively.[37] Therefore, this study had found grains like rice or noodles, sauces, poultry product and seafoods as food contributing most sodium. Similar finding was found in other study where the foods contributing to the high sodium were rice and noodle.[38] Surprisingly, most of the listed food groups add to the most sodium in daily diet.[39] Most Asians preferred more foods to give them a better taste while enjoying their meals.[40] According to culinary perspective, by adding salt it will improve the sensory possessions of virtually every food that humans consume, and it is cheap.[41]

There was a solid evidence of an association between respondent's knowledge, attitude and practice on salt diet and the urinary sodium excretion as determined by the assay of 24 hours' urine collection. Absence of knowledge about high salt diet can leads to hypertension, significantly contributed to high sodium urinary excretion. This is in line with findings by Land[15] who revealed that public tends to continue consuming excessive sodium intake in diet because they were not aware it will lead to hypertension as well as other co morbidities. It can be concluded that knowledge and attitude of the Malay healthcare staff were good, however, majority of them continue to consume sodium higher than recommended level.

The most likely explanation for high sodium consumption is that there are many barriers to change people's behavior, for example low-cost foods are high in salt and heavily advertised; and in adequate labeling of salt level. This in return is the key factor inhibiting reductions in salt consumption among even well-informed individuals.[25] Similarly result from MySalt 2015 survey highlighted that general knowledge regarding hypertension and other illnesses is worryingly low, despite the evidence linking salt intake to most conditions is very compelling.[17]

Evidence by a previous study suggested that the practice of reading food labels for sodium content among population was acceptable.[42] It demonstrated significant association between knowledge of some of the risk on health of salt intake and salt label usage.[43] Despite this, the research found more than half of the respondents preferred to read salt table content upon food purchasing. It was a significantly higher percentage among respondents with low sodium urinary excretion. Reading food labels for salt content is essential for individual to diminish salt intake. A better understanding and knowledge regarding salt intake status can be obtained following continuous exposure to reading food labels for sodium continuously as a habit.[42]

This study found that majority of respondents claimed to be adding salt either during cooking or at the table, and the association with the high- and low- salt intake was significant. It correlates with the finding from a previous study where most people tend to add more salt in the food will subsequently lead to high urinary sodium excretions.[44] It is due to a positive evidence linking the exposure to highly salty foods and an increase in preference. According to the respondents, the unpleasant taste of food without salt was the barrier to pursuing low salt diet.[45] Land[15] mentioned that most of us have developed a preference for salt taste in daily diet by consuming manufactured foods with high salt content and salty seasoning for many years. They hate the bland taste when salt is abruptly removed.

However, the use of other spices than salt in cooking still far beyond the practice. As shown in this study, most respondents who did not use herbs in cooking as an alternative for salt showed high urinary sodium excretion. It is probably due to lack of awareness with the various alternative ways of adding flavours to food such as spicing and natural flavours like lemon juice besides salt.[46] Some of respondents refused to change because of to re-program taste receptors might require two to three weeks adjustment with lower salt content diet. However, foods will no longer deemed 'tasteless' and one will begin to appreciate the natural flavours, once the taste sensory is adjusted.[47]

There are several strengths identified in this study. The use of food frequency questionnaires is useful because of the dietary intake assessment was done over a longer period than 24 hour dietary recalls; therefore, able to solve the problems associated with the high day-to-day variability of intake. Unfortunately, the precise quantification of daily intake is tremendously difficult. Besides that, this study did measure the urinary sodium excretion through a 'gold standard' 24-hour urine collection to estimate sodium intake. This method is often used as a measure to compare and validate other methods of sodium intake assessment.

Besides its strength, this study has several limitations. Firstly, the study was conducted among the healthcare workers, thus, probably they have extra motivation to collect urine correctly. Secondly, there could be a possibility of failure to collect the entire urine volume during 24 hours or collecting excess sample. Some of the respondents might have collected the urine volume greater than the normal human does in view of knowing that they were participating in a study that may lead them to drink more water than usual. Thirdly, there was a time different between assessment of dietary history and 24-hour urine collection which explain the weak correlations between the dietary sodium intake and 24 hours urinary sodium excretion. Lastly, the respondents knew that they were participating in the study, so they may restrict their sodium intake to ensure less amount of sodium being excreted, this is called Howthorne effect.

CONCLUSION

The study emphasizes that the level of sodium intake among Malay healthcare staff is greater than the recommendations both by the World Health Organization and Malaysia Clinical Practice Guideline for Hypertension. Poor knowledge and practice towards reducing salt consumption among respondents contributes to the high sodium consumption. As the study highlighted that the main source of sodium intake among Malay ethnicity was cooked food, thus more aggressive strategies are needed to enhance them to reduce the sodium usage while cooking. The practice of healthy eating in the population is needed as this is the key factor in combating the non-communicable diseases. Continuous awareness campaign is essential in order to educate consumers to minimize sodium consumption and to practice healthy eating.

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