บทความวิจัย

ความสัมพันธ์ระหว่างความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลือในกลุ่มพยาบาลไทย

The Relationship between Knowledge, Attitude and Practice towards Dietary Salt Intake among Thai Nurses

ธาริณี กิติกานันท์ (Tharinee Kitikanan)*
พัทธชนก กิติกานันท์ (Patchanok Kitikanan)**
สุพรรษา พินา (Suphansa Phina)***

Received: February 6, 2023
Revised: March 17, 2023
Accepted: April 20, 2023

บทคัดย่อ

งานวิจัยจำนวนมากศึกษาความสัมพันธ์ระหว่างความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลือ อย่างไรก็ตาม งานวิจัยที่ศึกษาความสัมพันธ์ของปัจจัยทั้งสามนี้ในกลุ่มพยาบาลยังมีจำนวนไม่มาก ทั้งที่การบริโภคเกลือเกินขนาดส่งผลเสียต่อสุขภาพ วัตถุประสงค์ของงานวิจัยนี้คือเพื่อศึกษาระดับความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลือในกลุ่มพยาบาลไทยที่ปฏิบัติงานที่โรงพยาบาลมหาวิทยาลัยนเรศวรและหาความสัมพันธ์ของปัจจัยทั้งสามนี้ กลุ่มตัวอย่างในงานวิจัยนี้คือ พยาบาล จำนวน 135 คน โดยเก็บข้อมูลจากแบบสอบถามออนไลน์ อาสาสมัครส่วนใหญ่เป็นเพศหญิง เครื่องมือวิจัยเป็นแบบสอบถามแบบมีโครงสร้างเพื่อใช้ประเมินระดับความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลือ ค่าอัลฟ่าครอนบาชสำหรับความคงเส้นคงวาภายในคำถามเชิงความเห็นแต่ละชุดมากกว่า 0.75 ผลการวิจัยพบว่า อาสาสมัครส่วนใหญ่มีค่าดัชนีมวลกายอยู่ในระดับปกติและมีความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลืออยู่ในระดับกลาง (M = 7.35, S.D. = 1.39 จาก 12 คะแนน; M = 37.36, S.D. = 9.80 จาก 65 คะแนน; M = 20.02, S.D. = 7.09 จาก 41 คะแนน) อาสาสมัครทั้งหมดเห็นด้วยว่าการบริโภคเกลือปริมาณมากสัมพันธ์กับโรคไตและความดันโลหิตสูง อาสาสมัครส่วนใหญ่ยอมรับว่าบริโภคเกลือเกินปริมาณที่บุคลากรทางการแพทย์แนะนำ นอกจากนี้ ผลการวิจัยจากค่าสหสัมพันธ์ของเพียรสันพบว่า ความรู้ในการบริโภคเกลือมีความสัมพันธ์ทางบวกกับทัศนคติในการบริโภคเกลือ (r = 0.21, p-value

**Corresponding author: Patchanok Kitikanan; E-mail: nicenanina@gmail.com
*พยาบาลวิชาชีพ โรงพยาบาลนพรัตนราชธานี (Registered Nurse, Nopparat Rajathanee Hospital)
**รองศาสตราจารย์ คณะมนุษยศาสตร์ มหาวิทยาลัยนเรศวร (Associate Professor, Faculty of Humanities, Naresuan University)
***พยาบาลวิชาชีพ โรงพยาบาลมหาวิทยาลัยนเรศวร (Registered Nurse, Naresuan University Hospital)

= 0.01) แต่ไม่พบความสัมพันธ์ระหว่างความรู้และการปฏิบัติต่อการบริโภคเกลือ และไม่พบความสัมพันธ์ระหว่างทัศนคติและการปฏิบัติต่อการบริโภคเกลือ ข้อค้นพบเหล่านี้แสดงให้เห็นถึงความจำเป็นในการออกแบบสื่อการสอนและการให้คำแนะนำเรื่องการบริโภคเกลือเพื่อเพิ่มระดับความรู้ ทัศนคติและการปฏิบัติต่อการบริโภคเกลือในกลุ่มพยาบาลไทย

คำสำคัญ: ความรู้ ทัศนคติและการปฏิบัติ การบริโภคเกลือ พยาบาล ไทย

Abstract

The relationship between knowledge, attitude and practice towards dietary salt intake has been investigated in a number of studies. Few studies, however, explored the correlation between these three dietary-salted-related factors in nurses although excessive sodium intake is the primary cause of illnesses. The aims of this study are to examine the knowledge, attitude and practice towards dietary salt intake among Thai nurses at Naresuan University Hospital, and to explore the relationship between these three factors. A total of 135 Thai nurses participated in the online survey of this study. The majority of the nurses were female. The survey instrument was a structured questionnaire assessing their knowledge, attitude and practice towards dietary salt intake. Cronbach's alpha for the internal consistency reliability of each set of multiple Likert items was higher than 0.75. The findings showed that most nurses had appropriate body mass index (BMI), and they had average levels of the knowledge, attitude and practice towards dietary salt intake (M = 7.35, S.D. = 1.39 out of 12; M = 37.36, S.D. = 9.80 out of 65; M = 20.02, S.D. = 7.09 out of 41). All subjects concurred that renal disease and high blood pressure were linked to a diet heavy in salt. Most subjects responded that they ate more salt than the recommended amount. The recommendations are those advised by health professionals. The Pearson's correlation coefficients showed that the dietary-salt-related knowledge was positively correlated with the attitude ($r = 0.21$, p-value = 0.01). Nevertheless, the relationships between the knowledge and behavior, and the attitude and behavior were not found to be correlated. These findings suggest the need for pedagogical health education and dietary counseling to enhance the dietary-salt-related knowledge, attitude and practice among Thai nurses.

Keywords: Knowledge, Attitude and practice, Dietary salt intake, Nurses, Thai

Introduction

High salt intake is a major challenge for kidneys to process and excrete. Although there are various types of salt, such as potassium salt (KCI) and sodium chloride, the one that frequently causes health problems and which is the focus of this study is sodium chloride. High salt intake might lead to a rise in blood pressure (BP) (He & MacGregor, 2010), cardiovascular disease and renal disease (He & Macgregor, 2012). Adults are advised by the World Health Organization (WHO) to limit their intake of salt to less than 2,000 mg/d (World Health Organization, 2012). The recommendation by the Central Chest Institute of Thailand in the department of Medical Services is not to take salt over 2,400 mg/day or over 1 spoonful per day (Department of Medical Services, 2020). However, Thailand is classified as a country with high-intake of sodium with approximately 3,636 mg/day (Chailimpamontree et al., 2021).

The Knowledge, Attitude and Practice model (KAP model) was developed by Launiala (2009). It proposes that knowledge, attitude and practice are interrelated. Knowledge affects attitudes, and positive attitude results in good practice. It affects practice both directly and indirectly. This model believes that attitude is a medium leading to the practice from the knowledge. It is also possible that knowledge affects attitude first, then the practice follows the attitude. Knowledge, attitude, and behavior (KAB) is also used as knowledge-attitude-practice (KAP) (Xu et al., 2010). It is a theoretical model of health education. It proposes that knowledge and attitude affect the change of behaviour (Schneider, 2003).

A number of research studies on salt intake using a survey on knowledge, attitude and practice were carried out (e.g., Haron, Kamal, Yahya, & Shahar, 2021; Khokhar, Nowson, Margerison, Bolam, & Grimes, 2019; Leyvraz et al., 2018; Zhang et al., 2013). An example of a study on salt intake with the survey of knowledge, attitude and practice is Khokhar et al., (2019). It investigated salt-related knowledge, attitudes and behaviors (KABs) of Australian parents and guardians for children under the age of 18, and people who did not provide care for children under this age in Australia. The knowledge, attitudes and behaviors of the subjects were explored with a questionnaire containing demographic and KABs questions. The findings showed that parents and guardians tended not to understand the connection between sodium and salt, and more susceptible to having trouble deciphering salt information on food labels, as opposed to other adults. They also tended to worry about a variety of food-related problems, try to reduce their salt intake, and add salt to their meals, relative to other adults. The other study is from Mahat, Isa, Tamil, Mahmood, Othman, & Ambak (2017) exploring the relationship of knowledge, attitude and practice among Malay healthcare professionals in Malaysia with 24-hours urine sodium excretion. The findings showed that being a male, obese, unsure that high salt intake can cause hypertension, thinking that they over-salted their diet, and using salt rather than other spices for cooking were significantly connected to high sodium excretion in the urine. This suggests that the subjects had excessive salt consumption. Although many studies were on knowledge, attitude and practice on salt consumption, most of them did not investigate the correlation between these three factors (e.g., Bhattacharya, Thakur, & Singh, 2018; Cheikh Ismail et al., 2019; Ghimire, Adhikari, Rijal, Kallestrup, Henry, & Neupane, 2019; Haron et al., 2021).

In addition, only one research study was on knowledge, attitude and practice towards salt intake among nurses (Mondal et al., 2019). In the study of Mondal et al., (2019), 211 nurses in Bangladesh were investigated

for their knowledge, attitude and practice towards salt intake. It was found that all nurses believed that excessive consumption of salt could lead to major issues, and most of them had an average level of knowledge regarding the negative effects of consuming too much salt. Many of them agreed that it was important to reduce their salt intake, and two-thirds had consumed salt in the appropriate amount. About half added extra salt during their meals and three-quarters took high-sodium processed food. However, the study of Mondal et al., (2019) did not investigate the relationship between knowledge, attitude and practice towards salt intake. In addition, to the best of our knowledge, none of the studies was on this topic among Thai nurses. Nurses are expected to have knowledge of dietary salt intake and other health-related topics. The knowledge, attitude, and practice of this topic among Thai nurses have not, however, been studied. Thus, this study aims to explore knowledge, attitude and practice towards salt intake among Thai nurses at Naresuan University Hospital. The nurses at Naresuan University Hospital were chosen as a representation of Thai nurses because there are numerous nursing departments there reflecting the diversity of nurses in Thailand and because this facility trains nursing students to become licensed professionals. This investigation is done via cross-sectional design. The results of this study will be beneficial to nurses in order to make them aware of knowledge, attitude and practice towards salt intake, and for the relevant organisations, such as hospitals, when planning a policy to promote knowledge, attitude and practice towards salt intake among Thai nurses. This might enhance the level and effectiveness in the medical service by health professionals for people in Thailand.

Research objectives

Two research objectives are set for this study: 1) to investigate knowledge, attitude and practice towards dietary salt intake among Thai nurses at Naresuan University Hospital; and 2) to explore the relationship among knowledge, attitude and practice towards dietary salt intake among Thai nurses.

Research questions and hypotheses

Regarding research questions, the first research question is as follows: To what extent do Thai nurses at Naresuan University Hospital have knowledge, attitude and practice towards dietary salt intake? For the first research hypothesis, it is expected that nurses would have great degree of knowledge, positive attitude and good practice towards dietary salt intake.

The other research question is as follows: Is there a relationship between knowledge, attitude and behaviour towards dietary salt intake among Thai nurses? For the second hypothesis, we expect the knowledge, attitude and behaviour towards dietary salt intake among Thai nurses will be positively correlated.

Methodology

Subjects: A total of 226 Thai nurses at Naresuan University Hospital were selected for this study based on sample size calculated using the formula by Yamane (1973): n = N / (1 + Ne2), i.e. n = 515 (n = 515 / 1+(515 x 0.052)). n stands for the sample size; N is the entire target population, and the margin of error is e. Inclusion criteria included the following: being a nurse at Naresuan University Hospital; being within the age range of between 20-65 years old; being able to read and comprehend a consent form and finish the survey instrument; having no health condition that might hinder the participation; and be willing to participate in the survey. They were selected via volunteer sampling, i.e. they elected to become part of this study. They may scan the QR code to access

the questionnaire, which was provided to them. Among this target number, 91 (40%) participants did not respond to the survey sent to them. The final number of participants was 135 with a response rate of 59.73%. Their ages ranged from 22 to 55 years old. Out of this pool of subjects, three were male.

Questionnaire: This study employed an online questionnaire using a Google Form. The questionnaire was adapted from the one in the study of Khokhar et al., (2019). It was divided into two parts: 1) personal information, and 2) knowledge, attitude and practice towards dietary salt. The first part comprised of 14 questions. The second part of the questionnaire comprised 15 questions with three aspects: knowledge, attitudes and practices. Body mass index (BMI) classification is according to that in WHO (World Health Organization BMI classification, 2016), following the study of Khokhar et al., (2019), i.e. underweight (BMI <18.5 kg/m2), healthy weight (BMI 18.5–24.9 kg/m2), overweight (BMI 25.0–29.9 kg/m2) and obese (BMI $\geq$30.0 kg/m2). To minimise the language barrier of the subjects, it was translated into Thai by the first author. The content and translation of the questionnaire was proofread by three registered Thai nurses who could speak English.

Data collection: The data were collected at Naresuan University Hospital. The data collection was permitted by the same hospital. The advertisement of the online questionnaire was distributed to nurses via their wards. The subjects participated in the study voluntarily. Informed written consent was obtained from all subjects before they filled in the questionnaire. They were informed that their personal information would be kept confidential. The total duration of data collection is approximately one month. The ethical approval of this project was obtained from Naresuan Institutional Review Board (COA No. 227/2022, IRB No. P2-0170/2565) since 4th July 2022.

Data analysis: As this study is a quantitative survey research, to explore the extent Thai nurses at Naresuan University Hospital have knowledge, attitude and practice towards dietary salt intake, the descriptive statistics, including frequency, percentage, standard deviation (S.D.), minimum (Min) and maximum (Max) were used to report the data. The missing data were excluded in the analysis. The evaluation of knowledge, attitude and practice towards dietary salt intake was as follows: High (70-100%), Medium (51-69%), and Low (0-50%). Cronbach's alpha coefficients were made for each set of the multiple Likert questions from all subjects to measure the internal consistency of the scales. They were higher than 0.75.

To investigate the relationship between knowledge, attitude and practice towards dietary salt intake among Thai nurses, the calculation of the total scores of knowledge, attitude and practice towards dietary salt intake was done according to the ones in the study of Khokhar et al., (2019). The total score of knowledge towards dietary salt intake was from the following items in Section 2: 1-4, 5-7, and the first question of item 9. The examples of the items for the knowledge were: "How much salt do you believe Thai people consume generally?"; and "The food label on Thai food goods contains information on the salt content of the product. What is the connection between sodium and salt?" The total score of attitudes towards dietary salt intake was derived from the second question of item 9 in Section 2. The examples of the items for the attitude were: "What ratio do you think your daily salt consumption has to the amount of salt that medical experts advise?"; and "Please rate your level of worry for each of the following food-related topics using the scale below." The total score of practice towards dietary salt intake was from items 11-15 in Section 2. The examples of the items for the practice were: "How frequently do you salt your meals at the table?"; and "How

often do you add salt to the food you make at home?" The interpretation of the score for each item could be seen in the study of Khokhar et al., (2019). Each response was given a point total. For instance, the participants received one point for a correct response to a question on knowledge and zero points for an inaccurate response (including "I don't know" or "I'm not sure"). Pearson correlation was employed for this part. To explore the correlation between knowledge, attitude and practice towards dietary salt intake among Thai nurses, the correlation package (Makowski, Ben-Shachar, Patil, & Lüdecke, 2020) in R statistical software (R Core Team, 2022) was used. The assumptions for the data were met for Pearson's r, i.e. both variables were on interval level of measurement; data from variables followed normal distributions; data contained no outliers; and the data was from a random sample. A p-value of <0.05 was considered significant for this analysis.

Results

1. Research question 1: To what extent do Thai nurses at Naresuan University Hospital have knowledge, attitude and practice towards dietary salt intake?

The total number of the nurses who responded to the questionnaire was 135. However, not all respondents answered all questions. The number of the answers for the demographic characteristics was hence less than 135. In general, most respondents were female (98.52%) with the age ranged between 22-33 years old (68.15%). A high number of them had appropriate BMI (66.67%). Only small numbers were underweight or overweight. The details of the demographic characteristics of the subjects are shown in Table 1.

Table 1 Demographic characteristics of the nurses in this study

Characteristics	Number/Frequency (%)	Characteristics	Number/Frequency (%)
Gender		Member(s) in the family, including me	
Male	2 (1.48)	1-3	74 (56.92)
Female	133 (98.52)	4-7	51 (39.23)
Age (years)		8-10	5 (3.85)
22-33	93 (68.15)	Member(s) with chronic disease (NCDs)	
34-45	31(23.66)	0	63 (46.67)
46-57	7(5.34)	1-3	71 (52.59)
BMI (kg/m2)		4-6	1 (0.74)
Weight category		Cooking at home by me (Likert scale)	
Underweight	17 (12.59)	0-3	63 (46.67)
Healthy weight	90 (66.67)	4-7	71 (52.59)
Overweight	20 (14.81)	8-10	1 (0.74)
Obese	8 (5.93)	Main grocery shopper	

Characteristics	Number/Frequency (%)	Characteristics	Number/Frequency (%)
Underlying		Yes	61 (45.19)
Hypertension	2 (1.77)	No	49 (36.30)
Other	1 (0.88)	I share the responsibility	25 (18.52)
None	110 (97.35)	Marital status	
Department		Single	134 (99.30)
Obstetrics and Gynecology	17 (12.59)	Married	1 (0.74)
Surgery	22 (16.30)	Highest education	
Medicine	19 (14.07)	Bachelor's degree	126 (93.33)
Pediatrics	28 (20.74)	Master's degree	8 (5.93)
Emergency	10 (7.41)	Others	1 (0.74)
Eye Ear Nose and Throat	3 (2.22)	Religion	
Other	36 (26.67)	Buddhism	130 (96.30)
Working experience (years)		Christianity	4 (2.96)
0-3	36 (26.67)	Islam	0 (0)
4-7	40 (29.63)	No religion	1 (0.74)

NOTE: The data in Table 1 are reported with the frequency and percentage in parentheses

Regarding the level of knowledge towards dietary salt intake, the subjects had an average score of 7.35 (S.D. = 1.39, 61.25%) out of 12. This suggests that the knowledge towards dietary salt intake is at the medium level. All nurses agreed that too much salt is associated with high blood pressure and kidney disease. Yet, their score towards the association between too much salt intake and stomach cancer is low (38.52%). The majority of nurses (98.52%) believed that too much salt in diet could damage their health. However, about half of them (49.63%) misunderstood that salt and sodium are the same thing. Most of them agreed that Thai people eat salt high levels of salt (85.19% replying "Far too much" and "Too much"). Only one third of the nurses (33.33%) were aware of the amount of salt intake recommended by health professionals per day. About half (56.30%) accurately answered that the main source of salt in the Thai diet is from processed foods. A small number of subjects (9.63% saying "Strongly disagree" or "Disagree") had an accurate understanding that Himalayan salt, pink salt, sea salt and gourmet salts do not provide any health benefits above plain table salt. For the attitude towards dietary salt intake, out of 65 points, the subjects' attitude towards dietary salt intake was at the average level (M = 37.36 (57.48%), S.D. = 9.80). It suggests that their attitude towards salt intake is neither positive nor negative. Most of them (65.93%) responded that they consumed salt a higher amount of salt than recommended by health professionals. Most of them agreed that food manufacturers (74.07% for responsible or very responsible) and themselves (77.04% for responsible or very responsible) should be responsible for the reduction of the amount of salt Thais eat. The subjects were more concerned about the fat in food content, saturated fat content and calories in food, rather than health eating, the quantity of salt and sugar in meals. This is shown by over 30% of "Very concerned" and "Extremely concerned" for the first three while less than 25% were concerned regarding healthy eating, the amount

of sugar and salt in food. About half of them (replying "Agree" and "Strongly agree") thought they found that lower salt options were not readily available when eating out (45.93%), and laws should be passed to limit the quantity of salt that is added to processed foods (58.52%). Most of them (72.59% replying "Agree" and "Strongly agree") agreed that when people cut less on salt in their diets, their health would improve.

In agreement with the levels of knowledge and attitude, the scores of the behavior towards dietary salt intake is also at the medium level (M = 20.02 out of 41 (48.83%), S.D. = 7.09). In the question asking subjects whether they added salt to their meals at the table, most subjects (77.11%) answered they rarely or never added salt to their meal. About half (46.67%) said they rarely or never added salt during cooking. When being asked if they put a salt shaker on their table whenever they ate, over 80% of the respondents said they rarely or never did so. The majority of the nurses (68.89%) tried to decrease the amount of salt they eat. When asking them their habits of reading a food label to check the salt/sodium content, a small number of the subjects (33.34%) did this. Similar to the finding of avoiding eating ready-to-eat foods, a small number of them (34.07%) often or always did this. Only one-fifth (20.74%) often or always avoided having food from fast food restaurants. Similar to the question asking whether they avoided ordering food from a takeout or restaurant with an Asian theme, only few subjects (14.07%) did so. A small number of the nurses (23.71% replied often or always) purchased foods labelled "no added salt", "salt reduced" or "reduced sodium". In addition, few subjects (14.81% replied often or always) often or always asked to have their meals prepared without salt.

2. Research question 2: Is there relationship between knowledge, attitude and practice related to dietary salt intake among Thai nurses?

According to the correlation analysis, it was found that practice related to dietary salt intake did not have significant correlation with both knowledge and attitude (p-value > 0.05). However, knowledge towards dietary salt intake was found to be significantly positively correlated to the attitude (r = 0.21, p-value = 0.01) although this correlation is weak. The scatter plot of the positive correlation between the knowledge and the attitude towards dietary salt intake among Thai nurses is shown in Figure 1.

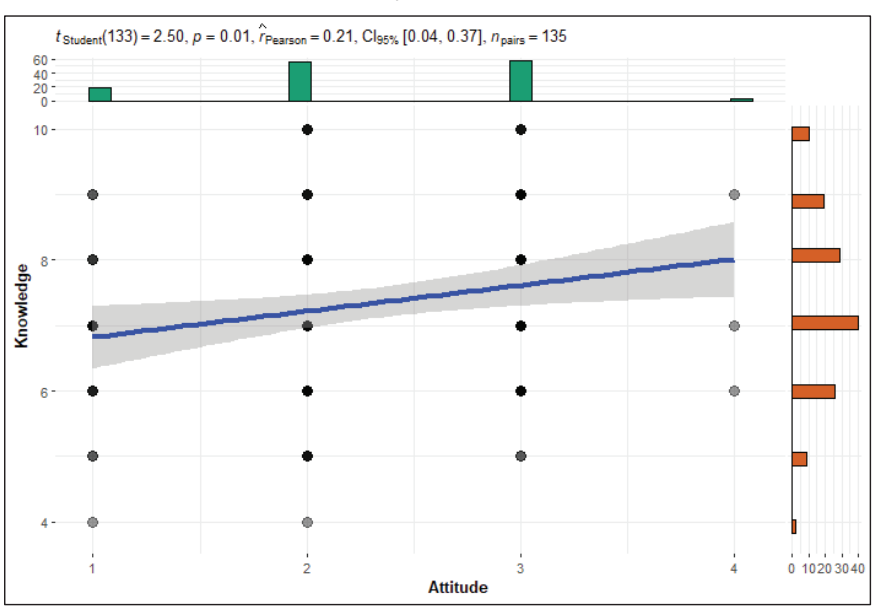


Figure 1. Scatter plot showing positive relationship between knowledge and attitude related to dietary salt intake among Thai nurses.

Discussion

Most subjects in this study had appropriate BMI. This is contrastive to the finding in the finding of Khokhar et al., (2019) that most parents of child/children and other adults were found overweight and obese. It is also dissimilar to most Thai subjects in the rural northern region of Thailand who were found to be overweight or obese (Rusmevichientong, Morales, Castorena, Sapbamrer, Seesen, & Siviroj, 2021) and Malaysian elders who were mostly overweight (Haron et al., 2021). It might be because nurses are in the healthcare profession. Their career focuses on providing support to patients and their families so that they can recover from sickness and continue to enjoy the best possible health and quality of life. This also promotes them to take care of themselves with good practice.

Regarding the knowledge related to dietary salt intake among Thai nurses, this study found that the nurses had average knowledge. It could be that they were unfamiliar with sodium usage. This is in agreement with the finding in the study of Mondal et al., (2019) that also found that Bangladeshi nurses also had average knowledge related to salt intake. It is also similar to the study of Mondal et al., (2019) that the nurses had low score for the association between too much salt intake and stomach cancer while they scored better in the associations between too much salt intake and other diseases. This suggests that the correlation between salt intake and stomach cancer might not be well known in the knowledge of nurses.

For the attitude related to dietary salt intake among Thai nurses, it was found that most nurses accepted that they consumed salt at the higher amount than recommended by health professionals. This is consistent with the finding in the study of Kasemsup & Taneepanichskul, (2013) that most subjects who were aged 1-15 years and 16 years and older had large amount of sodium exceeding recommendations. This finding is contrastive to the finding in the study of Ghimire et al., (2019) that two-thirds of Nepalese people reported having salt consumption at the right amount (66.1%). However, when measuring the actual salt intake consumption, it was found that the Nepalese respondents consumed higher amounts of salt than recommended. This indicates the gap in actual salt consumption and salt-intake perception. Additionally, although the subjects of this study were nurses, the finding that they had average level of attitudes towards dietary-salt intake was in agreement with the finding that both the non-hypertensive and hypertensive group had average scores of attitude (12.72 out of 20 points) towards the salt intake (Rusmevichientong, Morales, Castorena, Sapbamrer, Seesen & Siviroj, 2021). It could be that they do not believe that consuming sodium is the primary cause of illnesses.

For the practice related to dietary salt intake among Thai nurses, it was found that the subjects had an average level of practice in consuming salt. However, when considering the questions to ask about their adding salt into their meal, or having a salt shaker on the table at meal times, most of them responded that they rarely or never did so. In addition, about half of them replied that they rarely or never added salt during cooking. This might be because salt may not be the common condiment for Thai recipes. The taste of salt is generally salty. Most Thai recipes use fish sauce, soy sauce and oyster sauce which provide more tastes than salt. Theses condiments also contain high sodium. Some ingredients also contain salt in high amount. For example, fermented fish which is common condiment for Northeastern Thai dishes contains a sodium level of 5,000-6,000 mg/100 g (Photi,, Chavasit, Chitchang, Egkantrong, Chinchanupap, & Boonpraderm, 2020). Asking Thai subjects whether they added salt into their food might not cover main condiments

for Thai dishes. When the questions include other condiments for Thai dishes, the answers towards dietary-salt-related practice tend to be different.

The correlation coefficients between dietary-salt-related knowledge and attitudes in this study was found to be positively correlated, consistent to the finding in the study of Rusmevichientong et al., (2021) which showed a positive correlation between these two factors. It could be that they recognise the value of sodium consumption when they have a strong understanding of salt usage. However, while there was positive correlation between salt intake knowledge and practice, and salt intake attitude and practice in the study of Rusmevichientong et al., (2021), there the relationships between these two pairs of factors were not found to be significantly correlated in this study. This might be due to a different number of questions in the survey to investigate dietary-salt-related practice. In other words, the practice towards salt intake in the study of Rusmevichientong et al., (2021) was explored with three questions while there were 10 questions in our study. Even though the two questions were similar, i.e. asking about whether the subjects read the amount of salt on the nutrition label and whether they added salt to the food, the difference in the number of questions might outweigh the questions itself.

Limitations of the study

There are some limitations in this study. First, when considering the sample in our study, most data (98.52%) were responded by female nurses, and the response rate was rather low. Hence, our findings might not be generalised to the general population of nurses in Thailand. Further research might investigate the knowledge, attitude and practice related to salt intake among male nurses, or subjects with a balanced number of both sexes. Second, the knowledge, attitude and practice towards salt intake were analysed in one group of the subjects, i.e. we assumed that the nurses were homogenous. When these three factors are analysed in association to other factors, such as department of the nurses and BMI, the findings may show the difference between groups. For example, the nurses who are of a proper weight might have greater knowledge towards salt intake than those who are obese. Future research may consider taking these factors into consideration when analysing the three factors towards the salt intake. Third, in the survey of practice, the respondents were asked the salt-related questions. This is the translation from the study of Khokhar et al., (2019). In fact, many Thai condiments contain salt, for example, fish sauce, soy sauce and oyster sauce. Asking subjects whether they used or added salt into their meal may not cover the main sauces of sodium. Further study might include other condiments when asking subjects their practices towards sodium intake. Finally, this study collected the data from the survey, not the actual practice of salt intake, such as using the 24-hour-dietary-recall data. The findings might not reflect the actual practice of the respondents. They might answer the survey in the way it fits to the norm of the society, or the expectations of other people towards good practice of the nurses. Hence, for future research, the exploration of practice towards the salt intake might be done in a more concrete way.

Conclusion

This study provided an exploration on the knowledge, attitude and practice towards dietary salt intake among Thai nurses. It was found that Thai nurses had average levels of the dietary-salt-related knowledge, attitude and practice. They perceived that excessive salt intake is associated with renal disease and high blood pressure. They were aware that too much salt consumption might

cause health problems. In addition, they agreed that the responsibility of the reduction of the amount of salt Thais eat should belong to food manufacturers and themselves. However, regarding their habits of sodium intake, few subjects read food nutritional labels for the sodium content, and avoided eating ready-to-eat foods and having food from fast food restaurants. Very few of them avoided eating Asian food and purchased food with sodium-reduced label. This suggests that the educational intervention regarding dietary salt intake should be created to enhance their knowledge, adjust their attitude and practice. It was also found that the knowledge was positively correlated to the attitude. Contrastively, there was no relationship between the knowledge and the practice, and between the attitude and the practice. This implies that when Thai nurses are more educated about sodium in their diet, they tend to have more positive attitude towards their salt intake. As such, to adjust the dietary-salt-related attitude, the lecture on various topics of salt diet practice, such as recommended amount of salt intake per day by health professionals, health conditions that are linked with excessive salt intake, and whether Himalayan salt, pink salt, sea salt and gourmet salts are better than ordinary table salt should be provided to Thai nurses.

References

Bhattacharya, S., Thakur, J., & Singh, A. (2018). Knowledge attitude, and practice regarding dietary salt intake among urban slum population of North India. *Journal of Family Medicine and Primary Care, 7*(3), 526-530. https://doi.org/10.4103/jfmpc.jfmpc_60_17.

Chailimpamontree, W., Kantachuvesiri, S., Aekplakorn, W., Lappichetpaiboon, R., Sripaiboonkij Thokanit, N., Vathesatogkit, P., . . . Chuaykarn, N. (2021). Estimated dietary sodium intake in Thailand: A nationwide population survey with 24-hour urine collections. *The Journal of Clinical Hypertension, 23*(4), 744-754. https://doi.org/10.1111/jch.14147.

Cheikh Ismail, L., Hashim, M., H. Jarrar, A., N. Mohamad, M., T. Saleh, S., Jawish, N., . . . Aldarweesh, D. (2019). Knowledge, attitude, and practice on salt and assessment of dietary salt and fat intake among University of Sharjah students. *Nutrients, 11*(5), 941. https://doi.org/10.3390/nu11050941.

Department of Medical Services. (2020). Sodium, danger from tasty food: Recommendations to reduce salt intake. *News for Mass Media*. Retrieved January 2, 2023, from https://drive.google.com/file/d/1FwW88olHDMQw2-XEFah3P4zwlrpTYbkp/view?fbclid=IwAR24Ziegtru9KvO-Myu9pYcEBIVzWB0krHkuIYFfYmBKihWzVgLKn4bw1FE&pli=1 [โซเดียมภัยเงียบจากของอร่อย แนะนำวิธีลดเค็มง่าย ๆ ห่างไกลโรคไต]. [In Thai].

Ghimire, K., Adhikari, T. B., Rijal, A., Kallestrup, P., Henry, M. E., & Neupane, D. (2019). Knowledge, attitudes, and practices related to salt consumption in Nepal: Findings from the community-based management of non-communicable diseases project in Nepal (COBIN). The *Journal of Clinical Hypertension, 21*(6), 739-748. doi: 10.1111/jch.13544.

Haron, H., Kamal, N. F., Yahya, H. M., & Shahar, S. (2021). Knowledge, attitude and practice (KAP) of Malay elderly on salt intake and its relationship with blood pressure. *Front Public Health. 2021 Feb 4*;8:559071. doi: 10.3389/fpubh.2020. 559071. PMID: 33614563; PMCID: PMC7890185.

He, F. J., & MacGregor, G. A. (2010). Reducing population salt intake worldwide: from evidence to implementation. *Progress in cardiovascular diseases, 52*(5), 363-382. https://doi.org/10.1016/j.pcad.2009.12.006

He, F. J., & Macgregor, G. A. (2012). Salt intake, plasma sodium, and worldwide salt reduction. *Annals of medicine, 44*(sup1), S127-S137. https://doi.org/10. 3109/07853890.2012.660495

Kasemsup, R., & Taneepanichskul, S. (2013). Sodium intake and socio-demographic determinants of the non-compliance with daily sodium intake recommendations: Thai NHES IV. *J Med Assoc Thai, 96*(5), S161-S170. [In Thai].

Khokhar, D., Nowson, C., Margerison, C., Bolam, B., & Grimes, C. (2019). Comparison of salt-related knowledge, attitudes and behaviours between parents and caregivers of children under 18 years of age and other adults who do not care for children under 18 years of age in Victoria, Australia. *BMJ nutrition, prevention & health, 2*(2), 51-62.

Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters, 11*(1). 1-13.

Leyvraz, M., Mizéhoun-Adissoda, C., Houinato, D., Moussa Baldé, N., Damasceno, A., Viswanathan, B., . . . Bovet, P. (2018). Food consumption, knowledge, attitudes, and practices related to salt in urban areas in five sub-saharan African countries. *Nutrients, 10*(8), 1028. https://doi.org/10.3390/ nu10081028.

Mahat, D., Isa, Z. M., Tamil, A. M., Mahmood, M. I., Othman, F., & Ambak, R. (2017). The association of knowledge, attitude and practice with 24 hours urinary sodium excretion among Malay healthcare staff in Malaysia. *International Journal of Public Health Research, 7*(2), 860-870.

Makowski, D., Ben-Shachar, M. S., Patil, I., & Lüdecke, D. (2020). Methods and algorithms for correlation analysis in R. *Journal of Open Source Software, 5*(51), 2306. https://doi.org/10.21105/joss.02306.

Mondal, R., Sarker, R. C., Sayrin, R., Afrin, R., Zaman, K., Acharya, N. P., . . . Choudhury, S. R. (2019). Knowledge, Attitude and Practice towards Dietary Salt Intake among Nurses Working in a Cardiac Hospital in Bangladesh Sciences. *Cardiovascular Journal, 12*(1), 53-58. https://doi.org/10.3329/cardio. v12i1.43420.

Photi, J., Chavasit, V., Chitchang, U., Egkantrong, P., Chinchanupap, K., & Boonpraderm, A. (2020). Reduction of sodium intake from papaya salad with the use of sodium-reduced fermented fish in producing traditional seasoning sauce. *Journal of nutritional science and vitaminology, 66*(Supplement), S173-S178. https://doi.org/10.3177/jnsv.66.S173.

R Core Team. (2022). *R: A language and environment for statistical computing.* Vienna, Austria: R Foundation for Statistical Computing. Retrieved from https://www.R-project.org/.

Rusmevichientong, P., Morales, C., Castorena, G., Sapbamrer, R., Seesen, M., & Siviroj, P. (2021). Dietary salt-related determinants of hypertension in rural northern Thailand. *International Journal of Environmental Research and Public Health, 18*(2), 377.

Schneider, B. (2003). *Measuring results: Gaining insight on behavior change strategies and evaluation methods from environmental education, museum, health, and social marketing programs*. New York: Coevolution Institute.

World Health Organization. (2012). *Guideline: Sodium intake for adults and children*. Switzerland: World Health Organization.

World Health Organization BMI classification. (2016). *Secondary BMI classification*. Retrieved from http://apps.who.int/bmi/index.jsp?introPage=intro_3.html

Xu, W., Sun, G., Lin, Z., Chen, M., Yang, B., Chen, H., … Cao, K. (2010). Knowledge, attitude, and behavior in patients with atrial fibrillation undergoing radiofrequency catheter ablation. *Journal of interventional cardiac electrophysiology, 28*(3), 199-207. https://doi.org/10.1007/s10840-010-9496-2.

Yamane, T. (1973). *Statistics: an introductory analysis* (3rd ed.). New York: Harper and Row.

Zhang, J., Xu, A.-q., Ma, J.-x., Shi, X.-m., Guo, X.-l., Engelgau, M., . . . Wang, H.-c. (2013). Dietary sodium intake: knowledge, attitudes and practices in Shandong Province, China, 2011. *PloS one, 8*(3), e58973.