ความสัมพันธ์ระหว่างการรับรู้ตามแบบแผนความเชื่อด้านสุขภาพกับพฤติกรรมสุขภาพ ของผู้สูงอายุโรคหลอดเลือดหัวใจ
Relationship between Health Belief Perception and Health Behavior of Older Adults with Coronary Artery Disease

นิพนธ์ต้นฉบับ

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Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาระดับของพฤติกรรมสุขภาพของผู้สูงอายุโรคหลอดเลือดหัวใจ และศึกษาปัจจัยสัมพันธ์ระหว่างการรับรู้ตามแบบแผนความเชื่อด้านสุขภาพทั้ง 6 ด้านตามแบบแผนความเชื่อด้านสุขภาพ กับพฤติกรรมสุขภาพของผู้สูงอายุโรคหลอดเลือดหัวใจ **วิธีการศึกษา:** การศึกษาแบบภาคตัดขวางมีกลุ่มตัวอย่างจำนวน 113 ราย ใช้การสุ่มตัวอย่างแบบง่าย จากผู้สูงอายุที่มาคลินิกอายุรกรรมแผนกผู้ป่วยนอก โรงพยาบาลชลบุรี โดยใช้เครื่องมือการวิจัย ได้แก่ แบบสัมภาษณ์ข้อมูลทั่วไป แบบสัมภาษณ์การรับรู้ตามแบบแผนความเชื่อด้านสุขภาพ 6 ด้าน และแบบสัมภาษณ์พฤติกรรมสุขภาพของผู้สูงอายุโรคหลอดเลือดหัวใจ ทดสอบความสัมพันธ์ด้วยสถิติสัมประสิทธิ์สหพันธ์ของเพียร์สันและสถิติสหสัมพันธ์สเปียร์แมน **ผลการศึกษา:** เมื่อตัดกลุ่มตัวอย่างที่มีค่าคะแนน outlier เหลือจำนวน 110 ราย พบว่ากลุ่มตัวอย่างส่วนใหญ่ (ร้อยละ 99.1) มีพฤติกรรมสุขภาพระดับสูง (ค่าเฉลี่ย = 53.67 จาก 60 คะแนนเต็ม) พฤติกรรมสุขภาพสัมพันธ์กับการรับรู้ความสามารถของตนเองทางบวกระดับสูง ($r_{Spearman}$ = 0.811) กับการรับรู้อุปสรรคของการปฏิบัติพฤติกรรมสุขภาพทางลบระดับสูง ($r_{Spearman}$ = -0.811) และการรับรู้ประโยชน์ของการปฏิบัติทางบวกระดับปานกลาง ($r_{Spearman}$ = 0.359) (*P*-value < 0.001 ทั้งหมด) และสัมพันธ์กับการรับรู้ความรุนแรงทางบวกระดับต่ำ ($r_{Pearson}$ = 0.200, *P*-value < 0.05) แต่การรับรู้โอกาสเสี่ยง และการรับรู้สิ่งชักนำให้สู่การปฏิบัติพฤติกรรมสุขภาพไม่สัมพันธ์กับพฤติกรรมสุขภาพ **สรุป:** พฤติกรรมสุขภาพของผู้สูงอายุโรคหลอดเลือดหัวใจมีระดับสูง และสัมพันธ์กับการรับรู้ความสามารถของตนเอง การรับรู้อุปสรรคของการปฏิบัติ และการรับรู้ประโยชน์ของการปฏิบัติ สามารถนำสิ่งค้นพบนี้ไปส่งเสริมการสร้างเสริมพฤติกรรมที่เหมาะสมในผู้สูงอายุโรคหลอดเลือดหัวใจได้

คำสำคัญ: ผู้สูงอายุ, โรคหลอดเลือดหัวใจ, พฤติกรรมสุขภาพ, แบบแผนความเชื่อด้านสุขภาพ

Abstract

Objective: To determine health behavior of older adults with CAD and the relationships between the six health belief perceptions of Health Belief Model and health behavior. **Methods:** In this cross-sectional study, 113 participants attending the medicine clinic of outpatient department at Chonburi hospital, were selected by simple random sampling. The research instruments were a demographic interview, the health belief perceptions interview with 6 aspects, and the health behavior interview. Correlations were tested by Pearson's product moment correlation and Spearman rank correlation analyses. **Results:** With 3 participants excluded because of being outliers, a total of 110 participants remained in the study. Most of them (99.1%) had a high level of health behaviors (mean score = 53.67 of 60 points). Health behavior was significantly, positively correlated with perceived self-efficacy at a high level ($r_{Spearman}$ = 0.811), negatively correlated with perceived barriers at a high level ($r_{Spearman}$ = -0.811) and positively correlated with perceived benefits at a moderate level ($r_{Spearman}$ = 0.359) (*P*-value < 0.001 for all). Health behavior was significantly, positively correlated with perceived severity at a low level ($r_{Pearson}$ = 0.200, *P*-value < 0.05), but not correlated with perceived risk or perceived motivation. **Conclusion:** Health behavior in the elderly with CAD was at a high level, and significantly correlated with perceived self-efficacy, perceived barriers, and perceived benefits. These findings could be used for promoting health behavior in the elderly with CAD.

Keywords: older adults, coronary artery disease (CAD), health behavior, Health Belief Model

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Introduction

Coronary artery disease (CAD) in the elderly has becoming a larger burden to society and needs more effective behavioral intervention to slow down the progression and symptoms. Among various behavioral theories, Health Belief Model (HBM) has been promising in understanding the psychological elements surrounding the preventive behavior for CAD elderly patients. The understanding on the relationships between preventive health behavior for CAD elderly patients and six components of HBM could be used for effective intervention development and needed an investigation.

Coronary artery disease has been a major problem worldwide including Thailand. Based on the World Health Organization (WHO) data, 17.7 millions worldwide have

suffered from CAD, with a CAD related mortality rate of 31%.[1] Among Americans, CAD related mortality rate of 23.4%.[2] In Thailand, hospitalization rates according to CAD nationwide (Bangkok excluded) have been increasing continuously from 2012 to 2015 (427.53, 431.91, 407.70 and 501.13 cases per 100,000 populations, respectively).[3] In the fiscal year of 2018, CAD related mortality rate of 36.89 cases per 100,000 populations.[4] Under the provision of the health region 4, a mortality rate of 33.98 cases per 100,000 populations was reported.[5] Data of Chonburi Hospital, a tertiary hospital in Chonburi a province under the health region 4 revealed an increase in hospitalization rate from 2013 to 2016 (777, 815, 739 and 845 cases per year, respectively).[6] In 2018, Chonburi Hospital set a goal of lowered CAD related mortality and CAD complications among patients with high risk.

CAD is a chronic disease thus it affects the elderly physically including shortness of breath at rest or exertion and chest pain, from mild to life-threatening.[7] As a result, such physical sufferings could lead to psychological defect such as anxiety, fear of uncertainty or death, and stress in the elderly with CAD and their family members and caregivers.[8] Their social role cannot be maintained and daily living activities are limited. Since their living is changed, their social role is restricted, leading to boredom. More dependence and burden on others are evident. Economically, this causes more expenditure on the family and society as a whole either direct and indirect expenses for medical care, living, loss due to absence from work, etc.[9-11] Complications from CAD could also cause more expenditure, more stress and worse quality of life.[12]

These complications in CAD leading to heart failure are usually caused by poor diet behavior such as consuming condiments rich in monosodium glutamate (fish sauce, fermented fish, and salt). Once it becomes habitual, bland taste could be perceived if no such condiment. As a result, a moderate diet control behavior was found in a study[13] and health behavior among CAD patients was also found only moderately modified.[14] More intense poor health behavior could progress CAD to acute myocardial infarction.[15] To prevent such debilitating complication for the elderly with CAD, their healthy behavior should be promoted.[16] Health behaviors for the elderly with CAD including diet control[13], medication compliance[17,18], smoking cessation and secondhand smoke avoidance[7,18,19], exercise, stress management[14] help better control CAD and reduce the chance of complications.

Effectiveness of health behavior modification depends largely on behavioral factors. Among various health behavior concepts, Health Belief Model (HBM) has been promising in depicting the relationships between the behavior and related factors among patients with chronic illness.[20] Based on the preventive behavior concept of Stretcher and Rosenstock (1997), HBM proposes that to successfully engage in preventive behavior, individuals need to believe or perceive that they are at risk of being ill of the disease, and that the illness is severe and impacting their life. They also need to perceive that performing health behavior would be beneficial in reducing the risk of being ill or the severity of the illness. They need to perceive no barriers to perform such behavior such as unaffordable expenses, inconvenience, discomfort and embarrassment.

With the basis of belief or perception as the predictor of sustainable, specific health behaviors, HBM could be a promising candidate theory for health behavior modification for the elderly with CAD. In HBM, six components or dimensions influencing health behavior performing for the elderly with CAD include perceived risk of CAD, severity of CAD, benefits of performing preventive health behavior for CAD, barriers to performing such behavior, motivation to performing the behavior, and self-efficacy in adopting and maintaining the behavior effectively. HBM concepts were positively correlated with health behavior modification in CAD patients[14] and behavior for preventing diabetes mellitus.[22] In heart failure patients, HBM concepts were associated with salt restriction.[13] There have been no studies on the HBM and health behavior in the elderly with CAD. To further develop any interventions based on the HBM concepts to improve health behavior of the elderly with CAD, the associations between the behavior and each of the six components of HBM need to be established.

In this present study, we aimed to determine health behavior of the elderly with CAD. We also examined the associations between health behavior of the elderly with CAD and each of the six components of HBM which were perceived risk of CAD, severity of CAD, benefits of performing preventive health behavior for CAD, barriers to performing such behavior, motivation to performing the behavior, and self-efficacy. In accordance with the second objective, we hypothesized that health behavior was positively correlated with most of HBM components, except perceived barriers of which negative correlation was expected.

Methods

In this correlational descriptive research, the study population consisted of the patients aged 60 years or older diagnosed with CAD receiving care at the outpatient clinic, Chonburi Hospital. The sample size was based on the bivariate correlation of the pair of the main study variables. With a correlation of 0.26 between health behavior and overall score of HBM concepts in CAD patients from a previous study[14], a two-tailed type I error of 5%, and a power of test of 80%, a sample size 0f 113 was required. The sample size was calculated using the power analysis software G* Power 3.1.9.2.[23]

Study sample were those study population receiving care at Chonburi Hospital from November 2019 to February 2020 who met the inclusion criteria selected by simple random sampling technique. To be eligible, they had to be with stage 1 – 3 of CAD severity according to criteria the researchers modified from the New York Heart Association Classification.[24] Patients with stage 4 had shortness of breath at rest. Since they were considered too frail and needed urgent medical attention, they were ineligible for the study. They had to be able to communicate in Thai and had normal consciousness according to date, time, place, person and decision making based on Chula mental test (CMT), and no complications during the interview.

Research instruments

The Chula mental test (CMT) was used to screen mental stability of the participants. CMT tested the consciousness according to date, time, place, person and decision. It was tested in a sample of 212 elderly individuals in Bangkok. Its psychometric properties were acceptable with 100% sensitivity, 90% specificity, test-retest reliability (test-retest kappa coefficient of 0.65), and internal consistency reliability (Cronbach's alpha coefficient of 0.81). Under 13 topics, there 19 distinct questions. A correct answer was rewarded with one point; while zero point for the incorrect one. With a total score of 0 – 19 points, a total score of less than 15 indicates abnormal consciousness and those of 15 or higher indicate no abnormality.[25]

The first part of the questionnaire collected demographic and health status characteristics including age, gender, body mass index (BMI), marital status, education level, income sufficiency, smoking history, duration of CAD since diagnosed,

and co-morbidity. The second part of the questionnaire concerned all six components of HBM. These questions were developed by the researchers based on the concept of Stretcher and Rosenstock (1997) as guided by literature review, textbooks, and all relevant documents. Each of the six components contained 10 questions. Ten questions about perceived risk of CAD were based on risk factors of CAD; while 10 questions about perceived severity of CAD were based on impacts of CAD on increases in physical symptoms, mortality, disability, dependence, and depression, and changes in social function and more expenses. The content of 10 questions regarding perceived benefit of health behavior was based on health benefits of performing the behavior for CAD patients. For perceived barriers, 10 questions were based on various obstacles to performing the behavior as reported by CAD patients. For perceived motivation to performing the behavior, 10 questions were guided by internal factors such as CAD symptoms experienced by the patient, and external factors such as information, family members, neighbors, healthcare providers, and community. For the last component, 10 questions on perceived self-efficacy were based on various situations that could affect the confidence to perform health behavior. Each of the six components of the HBM questions had a response format of a Likert-type rating scale ranging from 1-disagree, to 2-sllightly agree, 3-very agree, and 4-highly agree. As a result, each set of questions had a total score of 10 – 40 points where higher scores indicated higher perception of risk, severity, benefit, motivation and self-efficacy. Since questions of perceived barriers were negative statements, its higher scores indicated lower perceived barriers.

The last part of the questionnaire contained 30 questions regarding health behavior beneficial for CAD patients including diet control, medication compliance, smoking cessation and secondhand smoke avoidance, exercise, and stress management. The response of frequency of performing the behavior was 0-never, 1-sometimes, and 2-always. With a total score of 0 – 60 points, higher total scores indicated higher level of health behavior performance. In addition, the total score was categorized as low, moderate and high level of health behavior performance of the elderly with CAD (0 – 20, 21 - 40 and 41 – 60 points, respectively).

Research instruments quality assurance

Questions of six components of HBM and of health behavior for CAD patients were tested for psychometric properties. Content validity was tested by five experts (one cardiologist, two experts in adult and geriatric nursing, one expert in psychiatric nursing and mental health, and one nurse practicing in geriatric nursing at a cardiology center). The six explanatory HBM components and the health behavior component had acceptable content validity with content validity index values of 0.96, 0.94, 0.98, 0.96, 1.00, 0.98 and 0.98, respectively.[26]

For reliability, the questionnaire was tested with 30 elderly with CAD at Chonburi Hospital who were comparable to the prospective participants. These seven parts had acceptable internal consistency reliability with Cronbach's alpha coefficients of 0.725, 0.785, 0.932, 0.705, 0.844, 0.743 and 0.889, respectively.[26]

Data collection procedure

The study was approved by the Ethics Committee for Graduate Study of the Faculty of Nursing, Burapha University (approval number: 06-05-2562) and by the Ethics Committee for Human Study of Chonburi Hospital (approval number: 91/62/N/q). The researchers introduced themselves to the prospective participants and provided objectives, process and benefits of the study. Voluntary nature of the study was explained. The participants could withdraw from the study at any time with no consequences or impact on their usual care. Once agreed, the participant was asked to provide a written informed consent. The interview took about 45 minutes with two 20-minute sessions a part with a 5-minute break. The interview was conducted from November 2019 to February 2020.

Statistical data analysis

Demographic and health status characteristics were presented with descriptive statistics including mean with standard deviation and frequency with percentage. These variables include age, gender, BMI, marital status, education level, income sufficiency, smoking history, duration of CAD since diagnosed, and co-morbidity. For the intensity of performing health behavior, mean with standard deviation of the behavior total score was presented along with frequency with percentage of patients with low, moderate and high level of health behavior performance. In examining the correlation between health behavior score and score of each of the six component of HBM, Pearson's correlation analysis was used if both test variables were normally distributed, and Spearman's rank correlation analysis if one or both of the test variables were not normally distributed.[27] In addition, correlation coefficients from the analyses mentioned above were categorized into low, moderate and high level of correlation (< 0.30, $0.30 – 0.70$ and > 0.70, respectively).[27] Statistical significance was set at a type I error of 5%. All statistical analyses were performed using the software SPSS version 20.

Results

Of a total of 11 participants, their mean age was 69.36 years old (Table 1). The majority of them were within 60 – 69 years of age (50.91%), male (52.73%), with normal BMI (18.5 - 22.99 kg/m^2) (31.82%), obesity level 1 (30.00%), married (60.91%), living with others (spouse, offsprings, and relatives) (85.45%), with primary school education (62.73%), with monthly family income of 0 - 4,999 Baht (22.73%), with sufficient family income (80.00%), never smoker (53.64%). For health status, the majority had stage 2 of NYHA Classification (83.64%), a duration of CAD since diagnosed of 1 – 6 months (26.36%), co-morbidity (87.27%), 3 co-morbid diseases (35.42%), and hypertension as co-morbid disease (36.12%) followed by hyperlipidemia (27.75%) (Table 1).

It was found that health behavior intensity was high with a mean score of 53.67 of the possible 60 points (Table 2). Once categorized, most but one of them (99.10%) had a high level of health behavior for CAD.

Health behavior of CAD had positive correlations with most components of HBM, except perceived barriers to performing health behavior as expected (Table 3). For positive correlations, health behavior for CAD patients was significantly correlated with perceived self-efficacy with a high level ($r_{Spearman} = 0.811$, P-value < 0.001), with perceived benefits with a moderate level ($r_{Spearman} = 0.359$, P-value < 0.001), with perceived severity with a low level ($r_{Pearson} = 0.200$, P-value = 0.036). On the other hand, health behavior was positively correlated with perceived risk and perceived motivation with a low level with no statistical significance. For negative correlation, health behavior was significantly correlated with perceived barriers with a high level ($r_{Spearman} = -0.811$, P-value < 0.001).

Table 1 Demographic and health status characteristics of the elderly with CAD (n = 110).

Characteristics	N	%
Age (years)		
60 - 69	56	50.91
70 - 79	39	35.45
≥ 80	15	13.64
($\bar{x}$ = 69.85, SD = 7.29, min = 60, Max = 87)		
Gender		
Female	52	47.27
Male	58	52.73
Body mass index (kg/m^2)		
< 18.5	5	4.54
18.5 - 22.99	35	31.82
23 - 24.99	26	23.64
25 - 29.99	33	30.00
≥ 30	11	10.00
Marital status		
Single	4	3.64
Married	67	60.91
Widowed/divorced/separated	39	35.45
Living arrangement		
Living alone	16	14.55
Living with others	94	85.45
Education level		
No formal education	9	8.18
Primary school level	69	62.73
Secondary school level	16	14.55
Associate level	6	5.45
Bachelor's degree	9	8.18
Postgraduate level	1	.91
Monthly family income (Baht)		
0 - 4,999	26	22.73
5,000 - 10,000	24	21.82
10,001 - 15,000	9	8.18
15,001 - 20,000	21	19.09
20,001 - 25,000	7	6.36
25,001 - 30,000	12	10.91
≥ 30,001	12	10.91
Income sufficiency		
Yes	88	80.00
No	22	20.00
Smoking history		
Never smoker	59	53.64
Current smoker	6	5.45
Past smoker	45	40.91
NYHA Classification		
Stage 1	3	2.72
Stage 2	92	83.64
Stage 3	15	13.64
Duration since CAD diagnosis (month)		
1 - 6	29	26.36
7 - 12	21	19.09
13 - 24	8	7.27
25 - 36	19	17.27
37 - 48	6	5.46
49 - 60	10	9.09
≥ 61	17	12.73
Co-morbidity		
No	14	12.73
Yes	96	87.27
Number of co-morbid disease		
1	20	20.83
2	32	33.33
3	34	35.42
4	9	9.38
5	1	1.04
Co-morbid disease (> 1 disease for a given patient)		
Hypertension	82	36.12
Hyperlipidemia	63	27.75
Diabetes mellitus	51	22.47
Chronic kidney disease	13	5.73
Gout	8	3.53
Cerebrovascular disease	4	1.76
Benign prostatic hyperplasia	4	1.76
Chronic obstructive pulmonary disease	1	0.44
Thyroid disease	1	0.44

Table 2 Health behavior level based on the total score of the elderly with CAD (n = 110).

Health behavior level	Possible score	Actual score	N	%
Moderate	21 - 40	39	1	0.90
High	41 - 60	41 - 60	109	99.10

($\bar{x}$ = 53.67, SD = 4.64, Min = 39, Max = 60)

Table 3 Correlations between health behavior total score and total score of each of the six components of HBM (n = 110).

HBM component	Correlation coefficient (r)	P-value
Perceived self-efficacy	0.811*	< 0.001
Perceived barriers	-0.811*	< 0.001
Perceived benefits	0.359*	< 0.001
Perceived severity	0.200†	0.036
Perceived susceptibility/risk	0.076*	0.433
Perceived motivation	0.058*	0.551

* Spearman's rank correlation, r_S.

† Pearson's correlation, r_{PS}.

Discussions and Conclusion

In determining how intense the health behavior among the elderly with CAD was, we found that 109 out of 110 patients had a high level of health behavior (99.10%), with a mean score of 53.67 out of 60 points. Health behavior that they had to regularly perform was compliance to medications as prescribed by the physician, including taking the right dose, at the right time, and not sharing medications either to or from other patients. They were supposed to take one sublingual tablet when having chest pain, and repeat one tablet every five minutes if not resolved. If three sublingual tablets were taken and the chest pain persisted, they were expected to go to the emergency room. They were advised to look for side effects of the medications such as easy or unusual bleeding.

Our participants engaged in various stress management including meditation, chanting or praying, reading books, listening to radio, and some leisure activities. When worried or concerned for something, they sought to consult with trusted individuals. Most of participants were in their 60 – 69 years of age (50.90%) which are considered the early elderly. Since their physical strength was relatively preserved, not frail, they could perform regular daily living activities. Age is considered a demographic factor potentially influencing the individual perception and hence their health behavior.[21] In addition, most participants experienced the illness within a relatively adequate duration, specifically 26.36%, 19.09%, and 17.27% experiencing the illness for 1 – 6, 7-12, and 25 – 36 months, respectively. Their age and duration of illness could

allow them to understand their illness, shape their perception on the illness and ultimately engage in protective health behavior.[28] Their mature age could allow for a rational decision making. Their slight physical deterioration forced them to seek regular medical care, advice and monitoring from multidisciplinary team at the hospital including physician, nurse, pharmacist, and dietitian. Performing health behavior promotes more appropriate health behavior.[29]

Thai living arrangement could influence health behavior. Most of the participants lived with their family members such as spouse, offsprings, and relatives (85.45%) and married (60.91%). In Thai culture, bonds between relatives and neighbors are evident. In addition to bonds with these individuals, patients also form certain bonds or trust with healthcare providers. These resources of support, reliability, and encouragement could enhance more health behavior in CAD patients.[30]

In our study, CAD of most participants was at stage 2 of the NYHA Classification (83.64%). They had no limitations on activities of daily living, but a slight limitation on intensive activities which could cause a mild shortness of breath.[24] Patients in our study engaged in exercise which could promote physical and mental health. Their physical performance could be maintained, and quality of life could be enhanced.[31] Regular, continuous exercise helps reduce blood lipid, hence better clinical outcomes of CAD[11], and is a crucial health behavior in the elderly.[32] The patients in our study acknowledged their co-morbid diseases where 87.27% stated that they had co-morbidity and the majority had 3 diseases (35.42%) and 2 diseases (33.33%) with hypertension and hyperlipidemia the most co-morbid diseases (36.12% and 27.75%, respectively). Realizing the consequences of these co-morbid illnesses could encourage them to engage more in preventive health behavior.

Our study found that health behavior among CAD elderly was positively correlated the most with perceived self-efficacy to performing preventive health behavior. The mean score of self-efficacy was very high (38.81 points) with the highest scores in 1) being able to see the doctor before the appointment when experiencing any abnormalities, 2) being able to take medications as prescribed, and 3) being able to self-care to control their CAD. With their prevalent co-morbidity, they learned to maintain their health by accepting more advice from family members, healthcare providers, and media. They could be more able to analyze and make a more sound decision in performing health behavior.[33] With a Spearman's correlation coefficient of 0.811 (P-value < 0.001), perceived self-efficacy had a high level of positive correlation with health behavior. High confidence in conducting the health behavior in various difficult situations could result in the change in the behavior. According to Stretcher and Rosenstock (1997), to change their behavior, their beliefs or perceptions need to be strengthened by confidence in following the advice and in their appropriate past conduct.[21] Previous studies also showed positive association between efficacy and health behavior in CAD[13,14,34], and diabetes mellitus and chronic kidney disease[35-37], and dementia preventive behavior in the elderly with hypertension with a low level of correlation.[38]

Participants in our study had a low level of perceived barriers (mean score of 11.96 points) with the highest level in 1) taking medications on time was difficult, 2) feeling embarrassed when exercise, and 3) not knowing who to ask for help when there were problems or concerns. With a significant, negative correlation with health behavior ($r_{Spearman}$ = -0.811, P-value < 0.001), low perceived barriers level was associated with high health behavior level as hypothesized. It is worth noting that level of perceived barriers was low. This indicated that this group of patients had adopted preventive behavior relatively well. They stated that they had low barriers to try diet control with food cooked by boiling, steaming, blanching or baking instead of frying. Since they were hospitalized at least once, they were advised about medication as prescribed by the doctor. There felt comfortable to avoid secondhand smoke, and to manage their stress that could influence their CAD symptoms. Since these patients perceived most barriers as low, there were more likely to engage in the healthy behavior. As suggested by Stretcher and Rosenstock (1997), if the person perceives that certain factors such as expenses and services are inconsistent, contradicting or inconvenient for their living or occupation, the person could face conflict which could lead to avoiding engaging the health behavior. The person then had to weight between benefits and barriers before the decision could be made.[21] Our finding of negative correlation of health behavior with perceived barriers was consistent with previous studies in CAD patients14 and in preventing dementia with a moderate correlation.[38]

Participants in our study had a relatively high level of perceived benefits of performing preventive health behavior

(mean score of 39.17 points). The most perceived benefits included 1) discontinuing medications without physician's permission could lead to CAD progress, 2) smoking cessation or secondhand smoke avoidance could help reduce the risk of getting CAD, and 3) smoking cessation or secondhand smoke avoidance could help reduce the risk of CAD progress. Perceived benefits to the health behavior were significantly positively correlated with the behavior as hypothesized ($r_{Spearman}$ = 0.359, P-value < 0.001) with a moderate level of correlation. With more benefits perceived, the patient was more likely to engage in the behavior. Participants in our study believed that more healthy behavior could benefit them. For example, compliance with appointed visit and compliance with advice from healthcare providers about the healthy behavior such as diet control, medication compliance, smoking cessation and secondhand smoke avoidance, exercise and stress management could help reduce CAD progress. The benefits must be intense enough for the individual to change their behavior to reach the goal.[21] Previous studies also showed positive correlation between perceived benefits and related behavior in preventing complications of hypertension[39] and in preventing heart failure progress by salt restriction.[13]

Perceived severity of CAD was found to be at a high level with a mean score of 35.47 of 40 points in this study. The highest severity included 1) late ER visit when experiencing shortness of breath could be life-threatening, 2) inappropriate health behavior could result in a life-threatening CAD progress, and 3) chest pain makes you scared of death. Perceived severity was significantly, positively correlated with health behavior with a low level ($r_{Pearson}$ = 0.200, P-value = .036) as hypothesized. Once the persons perceived that more severe illness could worsen their illness, pain, complications, disability, death and their living either psychologically, socially or economically, they were more likely to perform more healthy behavior to avoid the progress of CAD.[21] The positive correlation was also found in previous studies in salt restriction behavior and perceived progress of not restricting salt in heart failure patients[13] and progress in other chronic diseases such as hypertension, diabetes mellitus, and chronic kidney disease.[35-37,39-43] It was also consistent with a study revealing positive correlation between perceived severity of dementia and behavior to prevent dementia progress in hypertensive patients.[38]

Perceived risk of CAD was at a high level in this study (mean = 38.06 points) with the highest score in 1) strict medication compliance could help prevent CAD progress, 2) smoking and/or secondhand smoke exposure put people at risk of CAD, 3) hypertension or diabetes mellitus put people at risk of CAD. Perceived risk of CAD seemed to be positively, slightly correlated with health behavior with no statistical significance. This finding was not consistent with what was hypothesized that more perceived risk of CAD should result in more health behavior22 such as avoiding risks of CAD. Our no correlation between perceived risk of CAD and its health behavior was consistent with a previous study in diabetest[40], but inconsistent with studies where perceived risk of hypertension was correlated with healthy behavior in hypertensive patients (r = 0.427, P-value < 0.001)[39] and perceived risk of dementia was correlated with health behavior to prevent dementia.[38]

Perceived motivation to perform health behavior was at a high mean score of 39.69 points. The most rated motivations were 1) advice from physician and nurse encouraged you to perform health behavior to control CAD, 2) appointment card reminded you to see the physician as scheduled, and 3) reminder for health behavior could help reduce CAD progress. Perceived motivation was slightly positively correlated with the behavior with no statistical significance. Scores of individual statements were high. This could be due to the motivation induced during their hospitalization by knowledge provision by physician and nurse on symptoms, diet control, health behavior, and warning signs of CAD. In addition, with the target of reducing mortality and complications among CAD high risk group set by Chonburi Hospital in 2018, more public relation could remind the patient on relevant health behavior for CAD. Since most patients lived with others, they could be motivated by their spouse, offsprings and relatives. Based on Stretcher and Rosenstock (1997), cues to action were motivated both internal factors (health problems, symptoms, illness, and weakness) and external factors (health promotion campaign, news, advertisements via various media, learning through parents, spouse, offsprings, relatives, and others).[21] A previous study found no correlation between perceived motivation for CAD behavior and the behavior.[14] Receiving information about hypertension was not associated with self-care behavior.[45] On the other hand, perceived motivation to health behavior in heart failure patients was associated with the behavior.13 Such relations were also found in diabetes, hypertension and dementia.[36,38,40]

Our study had certain limitations. With a total of 113 participants required, we were able to recruit only 110 individuals. Future studies should recruit adequate number of participants. With only patients with stage 1 – 3 of NYHA Classifications recruited, generalization of the study results could be relatively limited. Future studies should employ patients with all stages with equal number.

Our findings could offer some implications. Healthcare providers could plan the campaign to promote perceived risk, severity, benefits, barriers, motivation and self-efficacy relating to CAD and its preventive health behavior. Such nursing care should also be facilitated by administrators. In nursing education, detail of our findings could be taught and used in nursing training.

In conclusion, health behavior in CAD elderly was at a high level. Health behavior was significantly, positively correlated with perceived self-efficacy at a high level, negatively correlated with perceived barriers at a high level, and positively correlated with perceived benefits at a moderate level (P-value < 0.001 for all). Health behavior was positively correlated with perceived severity of CAD at a low level (P-value < 0.05). However, health behavior was not correlated with perceived risk of CAD or perceived motivation to performing health behavior.

Acknowledgement

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