

## PERILAKU KESEHATAN DAN INDIKATOR KLINIS PASIEEN DENGAN INFARK MIOKARD DI INDONESIA

*(Health Behaviors and Clinical Outcomes Among Patients with Myocardial Infarction in  
Indonesia)*

**Yusshy Kurnia Herliani\*, Yaowarat Matchim\*, Charuwan Kritpracha\***

*\* Faculty of Nursing, Prince of Songkla University, Hat-Yai, Songkhla, Thailand, 90112,*

*Telp. 66-74-28-6520, Fax: 66-74-28-6421*

*E-mail: yusshy\_cute@yahoo.com*

### ABSTRAK

**Pendahuluan:** Perilaku kesehatan sangat penting untuk mencegah kemungkinan terjadinya serangan jantung serta menjaga kesehatan pasien dengan infark miokard. Selain itu, pemeriksaan indikator klinis juga sangat penting untuk mengoptimalkan program pengobatan dan memonitor adanya faktor risiko serangan jantung. Berdasarkan hal tersebut, penelitian ini bertujuan untuk (1) menjelaskan perilaku kesehatan dan indikator klinis pasien dengan infark miokard di Indonesia; dan (2) menganalisis hubungan perilaku kesehatan pasien dengan indikator klinis dan variabel lain yang telah ditentukan. **Metode:** Penelitian ini merupakan penelitian deskriptif korelasional dengan melibatkan 60 pasien dengan infark miokard. **Hasil:** Sebagian besar pasien berada pada tingkat cukup/ sedang untuk perilaku kesehatan secara keseluruhan, perilaku berolahraga, perilaku diet, dan manajemen stres. Sebagian besar pasien juga memiliki tingkat kepatuhan yang tinggi terhadap pengobatan dan berhenti merokok. Selain itu, tekanan darah dan indeks massa tubuh (IMT) pasien dengan infark miokard juga berada pada level normal. Sebaliknya, lebih dari separuh pasien dengan infark miokard memiliki kadar gula darah dan kolesterol yang tinggi, serta HDL yang rendah. Selain itu, hampir setengah pasien menunjukkan kadar LDL dan trigliserida yang tinggi. Lebih lanjut, perilaku olahraga menunjukkan hubungan yang negatif terhadap kolesterol total dan LDL, namun jenis kelamin menunjukkan hubungan yang positif dengan perilaku kesehatan secara keseluruhan dan perilaku berhenti merokok. Selain itu, penghasilan pasien per bulan menunjukkan hubungan yang positif terhadap perilaku olahraga dan diet; frekuensi hospitalisasi menunjukkan hubungan yang positif dengan tekanan darah sistolik; dan program pengobatan infark miokard menunjukkan hubungan yang positif dengan perilaku kesehatan, perilaku berhenti merokok, dan tekanan darah. **Diskusi:** program rehabilitasi jantung sebaiknya juga mengikutsertakan perilaku kesehatan dan indikator klinis didalamnya sehingga dapat mencegah terjadinya serangan jantung dan menjaga status kesehatan pasien dengan infark miokard.

**Kata kunci:** infark miokard, perilaku kesehatan, indikator klinis

### ABSTRACT

**Introduction:** Health behaviors are necessary for preventing possible cardiac events and maintaining health for MI patients. In addition to health behaviors, measuring clinical outcomes is a critical element for optimizing treatment and monitoring the risk factors of a cardiac event. The aims of this study were to (1) describe health behaviors and clinical outcomes among patients with myocardial infarction (MI) in Indonesia; and (2) investigate the relationship between their health behaviors, clinical outcomes, and other selected variables. **Methods:** Sixty hospitalized MI patients participated in this descriptive correlational study. Data were analyzed using descriptive and correlational statistics. **Results:** The majority of MI patients in this study had a moderate level of total health behaviors, exercise behaviors, dietary behaviors, and stress management. Interestingly, most of the patients had a high level of medication adherence, and smoking cessation. Also, their blood pressure (BP) and body mass index (BMI) of MI patients were at the normal level. In contrast, more than half the patients had a high level of fasting blood glucose and total cholesterol, and a low level of HDL. Moreover, nearly half of the patients presented a high level of LDL, and triglyceride. Exercise behaviors have a negative relationship with total cholesterol, and LDL. Interestingly, gender showed a positive relationship with total health behaviors, and smoking cessation. In addition, monthly incomes show a positive relationship with exercise behavior, and dietary behaviors. The number of times hospitalized appeared to have a positive relationship with systolic BP. Surprisingly, MI treatments showed a positive relationship with total health behaviors, smoking cessation, and BP. **Discussions:** In conclusion, cardiac rehabilitation should involve health behaviors and clinical outcomes to prevent recurrent cardiac events and maintain health for MI patients.

**Keywords:** Myocardial infarction, Health behaviors, Clinical outcomes

## **INTRODUCTION**

*Myocardial infarction (MI) is a leading cause of morbidity and mortality in the United States and other developed countries (Cabrera & Kornusky, 2014) and is one of the leading causes of disease burden in developing countries as well as Indonesia (Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2010). Therefore, health behaviors are necessary for preventing possible cardiac events and maintaining health for MI patients.*

*Health behaviors are the individual's activities performed in order to promote health, prevent disease, detect, and control symptoms of the disease (Edelman & Mandle, 2010). Based on the American Heart Association (AHA)'s recommendations, the health behaviors consisted of medication adherence, exercise, dietary modification, stress management, and smoking cessation (Balady et al., 2007). Health behaviors are important aspect for preventing hospital admissions as well as decreasing mortality among people who survive a MI (Boyde et al., 2014).*

*In addition to health behaviors, measuring clinical outcomes is a critical element for optimizing treatment and monitoring the risk factors of a cardiac event (Balady et al., 2007). Savage, Sanderson, Brown, Berra, and Ades (2011) reported that clinical outcomes will provide critical information to guide the treatment and support the program development. AHA recommended the control and maintenance of body weight, cholesterol, blood pressure, and blood glucose level (Balady et al., 2007; Hariadi & Ali, 2005) as strategies for modifying the risk factors of adverse cardiac events (Leifheit-Limson et al., 2013).*

*Nevertheless, existing educational program for MI patients still provide general information rather than consider in patient's information needs that cause patients failed to achieve the behavioral change and clinical goals recommendations (Boyde et al., 2014). Therefore, assessing information related to characteristic of health behavior and clinical characteristics among MI patients are*

*important to provide effective primary and secondary prevention of MI.*

*Despite there are few studies have investigated health behaviors and clinical characteristics of MI patients, previous researches were mostly conducted in western countries and were still limited in Indonesia. Moreover, the relationship between health behaviors, clinical outcomes, and MI patient's demographic data are not clear yet. Therefore, the aims of this study were to (1) describe health behaviors and clinical outcomes among patients with myocardial infarction (MI) in Indonesia; and (2) investigate the relationship between their health behaviors, clinical outcomes, and other selected variables among MI patients in Indonesia.*

## **METHOD AND MATERIALS**

*The sample of this study consisted of 60 MI patients admitted into the CICU (Cardiac Intensive Care Unit) and the HCCU (High Cardiac Care Unit) of Hasan Sadikin Hospital, Indonesia. Hasan Sadikin Hospital is a tertiary hospital located in West Java Province, Indonesia. Convenience sampling was used as sampling procedure of this study. The patients who met the inclusion criteria were approached to determine their willingness to participate in the study.*

*The inclusion criteria were: (1) age >18 years; (2) confirmed diagnosis of MI; (3) have no cognitive impairment; (4) agree to participate in the study; (5) be able to communicate in Indonesian language; (6) have stable hemodynamic levels; and (7) have no chest pain or dyspnea.*

*The instruments used to collect data in this study were the Demographic Data and Health Related Questionnaire (DDHQ), and Modified Myocardial Infarction Health Behaviors Questionnaire (Modified MIHQ). The DDHQ was used to collect the patient's demographic and health related data. The DDHQ was developed by the researcher. It included age, gender, marital status, educational level, monthly incomes, occupation, number of times hospitalized, types of MI, and treatments. The Modified*

*MIHBQ is a self-reported health behaviors questionnaire. It was modified from the MIHBQ that was developed by Ahyana (2013) based on cardiac rehabilitation and a secondary prevention guideline established by the AHA. The Modified MIHBQ is composed of 34 questions which cover 5 subscales including medication adherence, exercise behavior, dietary behavior, stress management, and smoking cessation. The score for each question ranged from one to four points. 1 = never (never perform the activity), 2 = sometimes (3–4 times per month), 3 = often (3–4 times per week), and 4 = routinely (5–7 times per week). For some negative questions, the score was reversed. The total score ranges from 34 to 136, higher scores indicate more frequent performance of health behaviors. Cronbach's alpha coefficient revealed a reliability score of .81.*

*The clinical outcomes assessed in this study consisted of blood pressure (BP), serum lipid (total cholesterol, HDL, LDL, triglyceride), fasting blood glucose, and body mass index (BMI). BP was measured by a mercury sphygmomanometer as recommended by the AHA as the gold standard for clinical measurement of blood pressure. To measure blood glucose and serum lipid, the patients were instructed to take nothing orally except water and medication for 12 hours before the tests. Blood glucose and serum lipid were measured at a standardized hospital biochemistry laboratory. BMI was calculated by measuring the height and the weight without shoes, with light clothing, and after urination. Body weight was measured using digital weight scale.*

*This study was also approved by the Research Ethics Committee of Faculty of Nursing, Prince of Songkhla University, Thailand, and Hasan Sadikin Hospital, Indonesia. The researcher explained to the potential subjects the purpose of the study, that participation in this study was voluntary, and that their anonymity would be ensured; the data would remain confidential and they had the right to refuse to participate in the study or withdraw at any time without any negative consequences. Patients who agreed*

*to participate signed the consent form before starting data collection.*

*Data were analyzed using descriptive and correlational statistics. Descriptive statistics were used to describe characteristics of the sample by using frequency, percentage, mean, and standard deviation. Preliminary testing was done to meet the assumption of parametric testing prior to running the parametric tests. Pearson's product-moment*

Table 1. Frequency, percentage, means, and standard deviations of the patients' demographic data (N = 60)

Characteristic	n	%
Age (range 37–79 years)	Mean = 56.33	SD = 9.25
Gender		
Male	47	78.3
Female	13	21.7
Marital status		
Married	57	95.0
Widower/ Widow	3	5.0
Educational Level		
No schooling	5	8.3
Elementary school	11	18.3
Junior high school	9	15.0
High school	24	40.0
College or higher	11	18.3
Monthly incomes		
< 1million IDR (< 76.97 USD)	16	26.7
1–2 million IDR (76.97–153.93 U SD)	17	28.3
2–4 million IDR (153.93–307.87 USD)	12	20.0
> 4million IDR (> 307.87 USD)	15	25.0
Occupation		
Entrepreneur	20	33.3
Government employee	7	11.7
Private sector employee	6	10.0
Farmer	1	1.7
Retired	7	11.7
Unemployed	19	31.7
Number of times hospitalized		
1	39	65.0
2	12	20.0
3	5	8.3
>3	4	6.7
Types of MI		
STEMI	49	81.7
NSTEMI	11	18.3
MI Treatment		
Medication	19	31.7
PCI	41	68.3

correlation statistic (*r*) was calculated to examine the relationship between health behaviors, clinical outcomes, and other selected variables among MI patients.

**RESULTS**

The majority of patients were men (78.3%), and married (95%) with a mean age of 56.33 years (ranging from 37 to 79 years). A high number of patients (28.3%) had monthly incomes of 1–2 million IDR (76.97–153.93 USD), followed by 26.7% who had monthly incomes of less than 1 million IDR (< 76.97 USD). Forty percent of the patients had a high school education and 56,6% were working in various sectors of commerce. The number of those who were hospitalized due to MI varies: 65% of the patients were diagnosed for the first time with MI and the rest had been hospitalized twice or more. In addition, 81,7% of the subjects were diagnosed with STEMI of which 68,3% of the patients had undergone Percutaneous Coronary Intervention (PCI).

The health behaviors scores among MI patients in this study ranged from 63 to 121, with the mean score of was 94.42 (SD = 12.43). The mean scores of health behaviors subscales are presented in table 2, which are:

medication adherence (*M* = 20.83), exercise behaviors (*M* = 20.10), dietary behaviors (*M* = 22.30), stress management (*M* = 17.88), and smoking cessation (*M* = 19.63).

Table 3 presents the frequency and percentage of level of health behaviors and each subscale. The majority of MI patients had a moderate level of total health behaviors (75%). Each subscale of health behaviors was reported differently. Most of the patients had a high level of medication adherence (76.7%), and smoking cessation (73.3%). The majority of the patients appeared to exhibit a moderate level of exercise behaviors (53.3%), dietary behaviors (43.3%), and stress management (55%).

The clinical outcomes of MI patients in this study are presented in table 4. The majority of MI patients in this study showed a normal level of blood pressure (70%), and body mass index (63.3%). In contrast, more than a half of the patients (61.7%) had a high level of fasting blood glucose. Approximately 41.7% had a high value of total cholesterol, 78.3% had a high level of LDL, 80% had a low level of HDL, and 46.7% had a high value of triglyceride.

The results of the bivariate correlational analysis using Pearson correlation coefficients

Table 2. Range, mean and standard deviation of health behaviors (N = 60)

<b>Health behaviors</b>	<b>Range</b>	<b>Mean</b>	<b>SD</b>	<b>Level</b>
Total health behaviors	63–121	94.42	12.43	Moderate
Medication adherence	14–24	20.83	3.04	High
Exercise behaviors	9–29	20.10	4.97	Moderate
Dietary behaviors	9–30	22.30	5.29	Moderate
Stress management	12–24	17.88	2.99	Moderate
Smoking cessation	6–24	19.63	5.72	High

Table 3. Frequency and percentage of level of health behaviors (N = 60)

<b>Health behaviors</b>	<b>Low</b>		<b>Moderate</b>		<b>High</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Total health behaviors	2	3.3	45	75.0	13	21.7
Medication adherence	0	0	14	23.3	46	76.7
Exercise behaviors	16	26.7	32	53.3	12	20.0
Dietary behaviors	11	18.3	26	43.3	23	38.3
Stress management	1	1.7	33	55.0	26	43.3
Smoking cessation	10	16.7	6	10.0	44	73.3

Table 4. Frequency and percentage of clinical outcomes (N = 60)

Clinical Outcomes	n	%
<b>Blood pressure</b>		
Normal	42	70.0
Hypertension (Systolic >140) (diastolic >90)	12	20.0
Hypotension	6	10.0
<b>Fasting blood glucose</b>		
Normal	23	38.3
Diabetes (>100)	37	61.7
<b>Total cholesterol</b>		
Normal	35	58.3
Hypercholesterolemia (> 200 mg/dL)	25	41.7
<b>LDL</b>		
Normal	13	21.7
High LDL (> 100 mg/dL)	47	78.3
<b>HDL</b>		
Normal	12	20.0
Low HDL (< 50 mg/dL)	48	80.0
<b>Triglyceride</b>		
Normal	32	53.3
High Triglyceride (>150 mg/dL)	28	46.7
<b>BMI</b>		
Normal (18.24)	38	63.3
Overweight $\geq 25 \text{ kg/m}^2$	19	31.7
Obese ( $\geq 30 \text{ kg/m}^2$ )	1	1.7
Underweight (<18)	1	1.7

(r) are presented in table 5. The results showed that exercise behaviors had a statistically negative relationship with total cholesterol ( $r = -0.27, p < 0.05$ ), and LDL ( $r = -.31, p < 0.05$ ). Other subscales of total health behaviors did not show any significant correlation with each clinical outcome.

Table 6 provides correlation data between health behaviors, clinical outcomes, and selected variables among MI patients. The results revealed that age, marital status, education, occupation, and types of MI did not have any significant relationship with health behaviors. Interestingly, gender showed a positive statistically relationship with total health behaviors ( $r = 0.33, < 0.01$ ), and smoking cessation ( $r = 0.28, p < 0.05$ ). In addition, monthly incomes show a positive significant relationship with exercise behavior ( $r = 0.33, p < .01$ ), and dietary behaviors ( $r = 0.29, p < .05$ ). Number of times hospitalized appeared as a statistically positive relationship with systolic blood pressure ( $r = 0.31, < 0.05$ ). Surprisingly, MI treatments that are divided into PCI and medication, showed a statistically positive relationship with total health behaviors ( $r = 0.53, < 0.01$ ), smoking cessation ( $r = 0.37, < 0.01$ ), systolic blood pressure ( $r = 0.27, < 0.05$ ), and diastolic blood pressure ( $r = 0.34, < 0.01$ ).

Table 5. Correlation (r) between health behaviors and clinical outcomes among MI patients

	Sys	Dias	FBG	TC	LDL	HDL	Trig	BMI
Total health behaviors	-.02	.21	-.09	-.12	-.17	-.06	-.04	.08
Medication adherence	.04	-.01	.24	-.04	-.07	-.01	.09	-.04
Exercise behavior	.14	.07	.05	-.27*	-.31*	.18	-.07	-.14
Dietary behavior	.09	.15	.04	-.18	-.24	.20	-.06	-.08
Stress management	.02	-.04	-.12	-.12	-.01	-.01	-.14	.17
Smoking cessation	.20	.24	-.11	-.20	-.15	-.05	-.22	.15

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

Note: Sys = Systolic blood pressure, Dias = Diastolic blood pressure, FBG = Fasting blood glucose, TC = Total cholesterol, LDL = Low density lipoprotein cholesterol, HDL = High density lipoprotein cholesterol, Trig = Triglyceride, BMI = Body mass index.

Table 6 Correlation (*r*) between health behaviors, clinical outcomes, and selected variable among MI patients

Variable	Age	G	M	I	E	O	H	TM	Treat
Total health behaviors	.19	.33**	.05	.14	.03	.06	.01	.01	.53**
Medication adherence	-.01	.08	.24	.09	.18	.11	.02	-.03	.12
Exercise behavior	-.14	-.06	.07	.33**	.17	-.18	.14	.05	.11
Dietary behavior	.01	-.10	.19	.29*	.19	-.21	.19	-.13	.13
Stress management	.05	-.02	-.07	.06	.04	.12	.12	-.05	.21
Smoking cessation	.09	.28*	.11	.17	.09	-.09	.23	.13	.37**
Systolic	-.06	.09	.18	-.13	.02	.05	.31*	.23	.27*
Diastolic	-.01	.23	.07	.08	.25	-.04	.20	-.18	.34**
Fasting blood glucose	.01	.09	.08	.06	-.11	.04	-.08	.01	-.14
Cholesterol	.02	.09	.00	-.09	.17	.21	-.25	-.06	-.09
LDL	-.01	-.01	.06	-.13	.06	.25	-.18	-.01	-.11
HDL	.08	-.10	-.19	.14	-.01	.07	-.11	.17	.11
Triglyceride	-.19	.14	.01	.09	.11	-.05	-.07	-.16	-.13
BMI	-.12	-.07	-.10	.17	.24	-.17	-.09	-.14	.21

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Note: Age, G = gender, M = marital status, I = incomes, E = education,

O = occupation, H = number of times hospitalized, TM = types of MI, Treat = MI treatment.

## DISCUSSION

Most of the patients in this study were men, and married with an average age of 56.33 years, ranging from 37 to 79 years. These results were supported by a previous study conducted in Indonesia, which noted that more than half of the patients were men with a mean age of 55.16 years (Ahyana, Kritpracha, & Thaniwattananon, 2014). Of the 81.7% who had been diagnosed with STEMI, 68.3% had undergone percutaneous coronary intervention (PCI). In the last two years, PCI was reported as the most common treatment for coronary heart disease (Venturini & Testa, 2014). The results of this study are congruent with a previous study of Mahgoub, Mohamed, Mohammed, Abdel-Aziz, and Kishk (2013) who reported that the majority patients with MI who had undergone PCI were males in the age group between 50 to 60 years.

The subjects in this study had middle and low monthly incomes. The majority of the patients had graduated from high school, and worked in various commercial sectors. The patients studied varied in terms of frequency of hospitalization and 35% had been hospitalized

twice or more due to MI. This finding is similar with what was reported by Kikkert et al. (2014) that 21.2% of patients still have a recurrent MI after receiving treatment. In addition, Ahyana et al. (2014) also reported that 53.1% of the subjects had been hospitalized twice. This finding revealed that secondary prevention was not performed optimally to prevent recurrent MI.

In regards to health behaviors, the majority of MI patients had a moderate level of total health behaviors. Each subscale of health behaviors was reported differently. The majority of the patients appeared to exhibit a moderate level of exercise behaviors, dietary behaviors, and stress management. Interestingly, most of the patients had a high level of medication adherence, and smoking cessation. These results differed from a previous study conducted by Ahyana et al. (2014) that revealed the level of total health behaviors and all the subscales including taking medication, exercise, dietary modification, and stress management were at a high level. However, in the study of Ahyana et al. (2014), smoking cessation was not investigated.

*MI patients had a high level of compliance in taking medication regularly because most of the subjects had more than one comorbid disease (hypertension, hypercholesterolemia, and diabetes mellitus) (Ahyana et al., 2014). The patients who had a history of smoking within the past 30 days were categorized as current smokers.*

*The clinical outcomes investigated in this study consisted of blood pressure, fasting blood glucose, serum lipid, and BMI. Hypertension was defined as systolic blood pressure > 140 mmHg or diastolic blood pressure > 90 mmHg. Obesity was defined as a body mass index (BMI) > 30 kg/m<sup>2</sup> and overweight was BMI >25 kg/m<sup>2</sup> (Leifheit-Limson et al., 2013). In addition, diabetes was defined as fasting blood glucose levels is more than 100 mg/dl (Go et al., 2014).*

*The majority of MI patients in this study showed a normal level of blood pressure, and body mass index (BMI). In contrast, more than half of the patients had a high level of fasting blood glucose. These findings are in agreement with those of Gaziano et al. (2010) who reported that Indonesia is in the top 10 in high absolute number of diabetics which indicates that Asian populations have a higher risk for developing DM even at a lower BMI due to a greater tendency of abdominal obesity.*

*Hypercholesterolemia was defined as total cholesterol > 200 mg/dL, an LDL cholesterol level greater than 100 mg/dL, or an HDL cholesterol level less than 50 mg/dL, and a triglyceride greater than 150 mg/dL (National Heart, Lung, and Blood Institute [NHLBI], 2014). In the present study, more than a half of the patients had a high level of total cholesterol, and a low level of HDL. Moreover, nearly half of the patients in the present study had a high level of LDL, and triglyceride. Total cholesterol was positively associated with ischemic heart disease mortality at all blood pressure levels (Zodpey, Shrikhande, Negandhi, Ughade, & Joshi, 2015). Moreover, high cholesterol levels are estimated to cause 56% of ischemic heart disease Worldwide (Gaziano et al., 2010). Lipids concentration is changed with MI. Serum lipid will increase*

*over the first 24 hours following MI. Patients with MI had the highest level of serum lipids than other types of CAD such as stable and unstable angina pectoris (Ornek et al., 2011).*

*The results of the present study showed that exercise behaviors have a statistically negative relationship with total cholesterol, and LDL. The findings are in agreement with those of which Gaziano et al. (2010) who reported that decreased exercise causes higher plasma cholesterol level. A lack of exercise can worsen other CHD risk factors, such as high blood cholesterol and triglyceride levels, high blood pressure, diabetes and obesity (NHLBI, 2014). These findings indicate that exercise lowers the levels of total cholesterol and LDL.*

*Other subscales of total health behaviors did not show any significant correlation with each clinical outcome. The results revealed that age, marital status, education, occupation, and types of MI did not have any significant relationship with health behaviors, and the clinical outcomes that were investigated in this study. These results were analyzed differently by Ahyana et al. (2014), who noted health behavior related with the age, and marital status. However, compared to the study of Ornek et al. (2011), serum lipids were not influenced by gender and age.*

*Interestingly, in the present study, gender showed a positive statistically relationship with total health behaviors, and smoking cessation. In general, men are more likely to smoke than women are. Smoking is now more common in the developing countries such as Indonesia with more than 60% male prevalence (Gaziano et al., 2010). A history of prior smoking was more strongly associated with MI in men compared to that in women (Anand et al., 2008), also it was reported that a woman controls smoking easier than a man (NHLBI, 2014). These findings indicate that gender is more likely to influence a person's behavior to avoid smoking, which results in a better level of total health behaviors. Therefore, female patients are more likely to have better health behaviors due to the better level of smoking cessation behaviors.*

*In addition, monthly incomes showed a positive significant relationship with exercise behavior, and dietary behaviors. These results are congruent with previous study which revealed that patients with higher income were more confident in adhering to exercise and maintain exercise behavior even when barriers were present (LaPier, Cleary, & Kidd, 2009). In the present study, the majority of the subjects had middle and low monthly incomes which affected exercise and dietary behavior.*

*Number of times hospitalized appeared as a statistically positive relationship with systolic blood pressure. Surprisingly, MI treatments that are divided into PCI and medication showed a statistically positive relationship with total health behaviors, smoking cessation, systolic blood pressure, and diastolic blood pressure. A previous study revealed similar findings with this study and noted that the risk factors for patients who underwent PCI were smoking, hypertension, and hyperlipidemia. Better control of these risk factors might potentially improve outcomes in these patients (Damman et al., 2013).*

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

*The majority of MI patients had a moderate level of total health behaviors, exercise behaviors, dietary behaviors, and stress management. Interestingly, most of the patients had a high level of medication adherence, and smoking cessation. The majority of MI patients in showed a normal level of BP, and BMI. In contrast, more than 50% of the patients had a high level of fasting blood glucose. More than half of the patients had a high level of total cholesterol, and a low level of HDL. Moreover, nearly half of the patients in the present study had a high level of LDL, and triglyceride.*

*Exercise behaviors had a negative relationship with total cholesterol, and LDL. This result indicates that the more a person exercises, the lower of total cholesterol and*

*LDL he/she will have. Other subscales of total health behaviors did not show any significant correlation with each clinical outcome. The results revealed that age, marital status, education, occupation, and types of MI did not have any significant relationship with total health behaviors, and all the clinical outcomes that investigated in this study. Interestingly, gender showed a positive relationship with total health behaviors, and smoking cessation*

*In addition, monthly incomes showed a positive significant relationship with exercise behavior, and dietary behaviors. Number of times hospitalized appeared as a positive relationship with systolic blood pressure. Surprisingly, MI treatments that are divided into PCI and medication showed a positive relationship with total health behaviors, smoking cessation, and blood pressure.*

### **Recommendation**

*Cardiac rehabilitation should involve health behaviors and clinical outcomes to prevent recurrent cardiac events and maintain health for MI patients.*

## **REFERENCES**

- Ahyana., 2013. *The effect of self-efficacy enhancing cardiac rehabilitation program on health behaviors among patients with Myocardial Infarction in Aceh, Indonesia* (Master's thesis). Prince of Songkla University, Thailand.
- Ahyana., Kritpracha, C., & Thaniwattananon, P., 2014. Health behaviors among patients with myocardial infarction in Aceh, Indonesia. *Songklanagarind Journal of Nursing*, 34, 109-118.
- Anand, S.S., Islam, S., Rosengren, A., Franzosi, M.G., Steyn, K., Yusufali, A.H., Yusuf, S., 2008. Risk factors for myocardial infarction in women and men: insights from the interheart study. *European Heart Journal*, 29, 932–940. doi:10.1093/eurheartj/ehn018
- Balady, G.J., Williams, M.A., Ades, P.A., Bittner, V., Comoss, P., Foody, J.M., Southard, D., 2007. Core components



- of cardiac rehabilitation/secondary prevention programs: 2007 update: a scientific statement from the American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee, the Council on Clinical Cardiology; the Councils on Cardiovascular Nursing, Epidemiology and Prevention, and Nutrition, Physical Activity, and Metabolism; and the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation*, 115, 2675-2682. doi:10.1161/circulationaha.106.180945
- Boyde, M., Grenfell, K., Brown, R., Bannear, S., Lollback, N., Witt, J., Aitken, L., 2014. What have our patients learnt after being hospitalised for an acute myocardial infarction? *Australian Critical Care*, 1–6. doi: <http://dx.doi.org/10.1016/j.aucc.2014.05.003>
- Cabrera, G & Kornusky, J., 2014. Acute Myocardial Infarction. In D. Pravikoff & D. Pravikoff (Eds.), (pp. 2p). Glendale, California: Cinahl Information Systems.
- Damman, P., Woudstra, P., Kuijt, W.J., Kikkert, W.J., Hoef, T.P.V.D., Grundeken, M.J., Winter, R.J.D., 2013. Short- and long-term prognostic value of the timi risk score after primary percutaneous coronary intervention for st-segment elevation myocardial infarction. *Journal of Interventional Cardiology*, 26(1), 8–13. doi: 10.1111/j.1540-8183.2012.00763.x
- Edelman, C.L., & Mandle, C.L., 2010. *Health promotion throughout the life span* (7<sup>th</sup> ed.). Philadelphia, PA: Mosby Elsevier.
- Gaziano, T.A., Bitton, A., Anand, S., Abrahams-Gessel, S., & Murphy, A., 2010. Growing epidemic of coronary heart disease in low- and middle-income countries. *Current Problems in Cardiology*, 35(2), 72–115. doi: <http://dx.doi.org/10.1016/j.cpcardiol.2009.10.002>
- Go, A.S., Mozaffarian, D., Roger, V.L., Benjamin, E. J., Berry, J. D., Blaha, M. J., Turner, M. B., 2014. Heart disease and stroke statistics—2014 Update: A report from the American Heart Association. *Circulation*, 129, e28-e292. doi:10.1161/01.cir.0000441139.02102.80
- Hariadi & Ali., 2005. *Hubungan obesitas dengan beberapa faktor risiko penyakit jantung koroner di laboratorium klinik Prodia makassar tahun 2005 [Correlation between obesity and multiple risk factors of coronary heart disease in Prodia clinical laboratories makassar in 2005]*, 1–14. Retrieved from: <http://arali2008.files.wordpress.com/2008/09/obesitas-dan-jantung-koroner>.
- Kikkert, W.J., Hoebers, L.P., Damman, P., Lieve, K.V., Claessen, B.E., Vis, M.M., Henriques, J.P., 2014. Recurrent myocardial infarction after primary percutaneous coronary intervention for ST-segment elevation myocardial infarction. *American Journal of Cardiology*, 113, 229–235. doi:10.1016/j.amjcard.2013.08.039.
- LaPier, T.K., Cleary, K., & Kidd, J., 2009. Exercise self-efficacy, habitual physical activity, and fear of falling in patients with coronary heart disease. *Cardiopulmonary Physical Therapy Journal*, 20(4), 5–11.
- Leifheit-Limson, E.C., Spertus, J.A., Reid, K.J., Jones, S.B., Vaccarino, V., Krumholz, H.M., & Lichtman, J.H., 2013. Prevalence of traditional cardiac risk factors and secondary prevention among patients hospitalized for acute myocardial infarction (AMI): variation by age, sex, and race. *Journal of Women's Health (15409996)*, 22(8), 659–666. doi: 10.1089/jwh.2012.3962
- Mahgoub, A.A., Mohamed, W.Y., Mohammed, M.A., Abdel-Aziz, M.A., & Kishk, Y.T., 2013. Impact of knowledge about early ambulation on patients' satisfaction post Percutaneous Coronary Intervention, at Assiut University Hospital. *Medical Journal of Cairo University*, 81(2), 97–104.
- National Heart, Lung, and Blood Institute., 2014. *Lower heart disease risk: what are the risk factors of heart disease*. Retrieved from <http://www.nhlbi.nih.gov/health/educational/hearttruth/lower-risk/risk-factors.htm>
- Ornek, E., Murat, S., Duran, M., Turfan, M., Kurtul, A., Demircelik, M.B., Akdemir,

- R., 2011. The relationship between lipoprotein(a) and coronary artery disease, as well as its variable nature following myocardial infarction. *Clinical & Investigative Medicine*, 34(1), E14-E14.
- Savage, P.D., Sanderson, B.K., Brown, T.M., Berra, K., & Ades, P.A., 2011. Clinical research in cardiac rehabilitation and secondary prevention: looking back and moving forward. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 31, 333–341. doi:10.1097/HCR.0b013e31822f0f79
- Venturini, E., & Testa, R., 2014. Cardiac rehabilitation and percutaneous coronary intervention: Together against global burden of cardiovascular disease. *Journal of Cardiology and Therapy*, 1(1), 3–11. doi:10.6051/j.issn.2309-6861.2014.01.9.
- Zodpey, S.P., Shrikhande, S.N., Negandhi, H. N., Ughade, S. N., & Joshi, P.P., 2015. Risk factors for acute myocardial infarction in central India: a case-control study. *Indian Journal of Community Medicine*, 40(1), 19–26. doi: 10.4103/0970-0218.149265