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Health-promoting Lifestyle in Patients after Percutaneous Coronary Intervention

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Conflict of Interest
The authors have no financial conflicts of interest.

ABSTRACT

Background and Objectives: The purpose of this study was to determine the status of health-promoting behaviors in patients after percutaneous coronary intervention (PCI) and explore what factors affect healthy lifestyle behaviors.
Methods: A total of 120 patients with coronary artery disease after PCI was included in this study. The Health Promoting Lifestyle Profile (HPLP) II was used to assess health-promoting lifestyle behavior. Data analysis was performed by t-test, analysis of variance, and multiple linear stepwise regression analyses.
Results: The average age of the participants was 60.10±9.84 (range, 37–81) years old. Among the participants, 86.7% were men and 13.3% were women. In all, 24.2% of the patients had an excellent level of health-promoting lifestyle and 74.2% had a moderate level of health-promoting lifestyle. The spiritual growth scores were the highest, while stress management and physical activity scores were the lowest. The level of health-promoting lifestyle was higher for people with higher income and a diagnosis of stable angina.
Conclusions: Healthcare providers should focus on promoting physical exercise and stress management for patients after PCI. It is also necessary to keep an eye out for patients with low income and severe illness to encourage a health-promoting lifestyle in these subsets of patients.

Keywords: Cardiovascular diseases; Coronary artery disease; Health promotion; Percutaneous coronary intervention

INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death globally.[1] In 2012, the World Health Organization (WHO) estimated that 17.5 million people died of CVD, accounting for 31% of the global death rate. Of these deaths, 7.4 million (13.1% of deaths worldwide) died of coronary artery disease (CAD).[2] In China, with the rapid development of the social economy, the lifestyles of people have changed greatly. In particular, with the aging population and the acceleration of urbanization, the prevalence of CVD risk factors in China have increased significantly, leading to the continued increase in the incidence of CVD. From 2002 to 2013, the mortality of CAD showed an upward trend. In 2013, 100.86 people out of 10 million died of CAD in urban areas, while in rural areas, the number was 98.68 people out of 10 million. In the next 10 years, the number of patients with CAD will continue to grow rapidly. Over

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the past few decades, percutaneous coronary intervention (PCI) has become a commonly used method for the treatment of CAD. Adopting PCI as a method of revascularization has increased steadily across the world, including in China.[3] From 2001 to 2011, the incidences of hospitalizations for PCI increased from 9,678 to 208,954 (21-fold) in urban China.[4)5]

It is well known that CAD is closely related to lifestyle and can be prevented through healthy lifestyle modifications.[6] Smoking, lack of physical activity, unhealthy diet, stress, and other poor lifestyle choices, which are modifiable, have been identified as major risk factors for CAD.[7] Modern styles of living and the accelerated rhythm of life may lead people to adopt unhealthy lifestyles. However, it remains a critical issue whether or not long-term adherence to a healthy lifestyle prevents CAD.[8] Early and late outcomes after PCI are also determined by lifestyle choices. However, research shows that over 80 percent of patients with CAD do not maintain a health-promoting lifestyle.[9] In fact, recent research has shown that most patients with CAD have overly optimistic beliefs of the potential benefits of PCI to extend life or to prevent another myocardial infarction.[10-12] Maintaining a health-promoting lifestyle means controlling their behaviors in daily life that can impact one's health and selecting behaviors that are appropriate for one's own health status.[13] A healthy way of life, such as quitting smoking, participating in various physical activities and having a proper diet, can significantly lower the risk of CAD recurrence.[14] Unfortunately, it seems that the strong recommendation of a healthy lifestyle has little effect on patients, as many of them fail to adopt and maintain healthy behaviors. A recent research study from 17 countries showed that 18.5% of patients with CAD continue to smoke and less than 36% of these individuals undertake a high level of physical activity. No more than 40% of these individuals maintain a healthy diet.[15]

Compared with 10 years ago, great changes have taken place in China's way of life: individuals eat too much, smoke more, have increased anxiety and exercise less.[16] Therefore, understanding the factors that affect health-promoting behaviors is vital to improve patients' knowledge and behaviors to lower the risk of future cardiovascular events for patients with CAD.[7] There is currently no research on health-promoting behaviors for patients with CAD who have undergone PCI in China. The factors that affect patients' healthy lifestyle behaviors and who have become more aware of risk factors have not been explored. This study was conducted to determine the status of health-promoting behaviors in post-PCI patients by applying the Health Promoting Lifestyle Profile (HPLP) II.

The aim of this study is to better understand health-promoting lifestyle behaviors in post-PCI patients as well as identify demographic and disease-specific factors associated with health-promoting lifestyle behaviors.

METHODS

This descriptive study was carried out on patients with CAD after PCI before hospital discharge from the department of Cardiovascular Internal Medicine of the First Affiliated Hospital of Chongqing Medical University in Chongqing from 1 March to 30 August 2016. A total of 120 patients who were 18 years old or above and underwent PCI before discharge were included in the research.

Data were gathered by a socio-demographic and disease-specific characteristics questionnaire and the HPLP II. The questions included in the socio-demographic and

disease-specific characteristics questionnaire were age, marital status, occupation, monthly income (RMB), living place, insurance, etc. The HPLP II has been used widely to measure an individual's health-promoting lifestyle.[17][18] The HPLP II includes 52 items that cover 6 domains: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. Each domain contains 9 items, excluding physical activity and stress management, which only contain 8 items. Each item was scored on a 4-point scale (never=1, sometimes=2, often=3, and routinely=4). The total scores of HPLP II range from 52 to 208. Low scores indicate a worse level of health-promoting lifestyle. We categorize HPLP II into 3 levels: weak, moderate and excellent health lifestyle performance, representing scores below 50%, between 50% and 75%, and above 75% of the highest scores, respectively.[23] In a previous study, the Cronbach's alpha of the HPLP II for patients with CAD ranged from 0.82 to 0.89.[19] For our study, the Cronbach's alpha was 0.90.

Data were analyzed using Statistical Package for Social Sciences software (SPSS) version 21.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (frequencies, percentages, minimum, maximum, means and standard deviations) were used to describe the socio-demographic and disease-specific characteristics as well as scores on health-promoting lifestyle behaviors. T-test and analysis of variance were used to analyze the differences between health-promoting lifestyle behaviors by socio-demographic and disease-specific characteristics. In addition, a multiple linear stepwise regression analysis was used to assess the associations between health-promoting lifestyle scores and demographic characteristics. The $p<0.05$ was considered to be significant. Before collecting the data, approval for this research was obtained from the ethics committee of the First Affiliated Hospital of Chongqing Medical University. All subjects provided informed consent. All information provided by the patient was kept confidential, and patients were allowed to withdraw from the research at any time.

RESULTS

Table 1 shows the research participants' socio-demographic and disease-specific characteristics. Altogether, 120 patients completed the surveys. The average age of the participants was 60.10±9.84 (range, 37–81) years old. Most of the participants were male (n=104, 86.7%) and married (n=105, 87.5%). Three-quarters of the patients (n=90) completed junior high school or above, and nearly half (n=57, 47.5%) of the participants were retired. More than half of the participants (n=56, 46.7%) earn more than 2,000 RMB a month, whereas 10.0% (n=12) of them earn less than 1,000 RMB. A majority of the participants (n=103, 85.8%) were living in the city. Most patients (n=89, 74.2%) had employment-linked insurance. Meanwhile, more than half (n=70, 58.3%) of the participants have a history of hypertension and 20% (n=24) of them have a history of diabetes. Three fourths of the participants (n=91, 75.8%) have a history of smoking and half of them (n=60, 50%) have a history of drinking. Average body mass index (BMI) was 24.98±4.76 kg/m²; more than half (n=69, 57.5%) of the participants were overweight (BMI ≥24.0). The duration since diagnosis of CAD ranged from 3 days to 216 months, and most of the participants (n=83, 69.2%) were diagnosed with CAD within the previous month. The types of CAD were categorized into 3 groups: stable angina (n=25, 20.8%), unstable angina (n=41, 34.2%), and myocardial infarction (n=54, 45.0%). More than 90% of the participants (n=109, 90.8%) live with other people, while 9.2% (n=19) live alone. Previous PCI was reported by 10.8% (n=13) of the participants.

Table 1. Differences in HPLP II scores by socio-demographic and disease-specific characteristics (n=120)

Variable	Categories	Number (%)	Score (Mean±SD)	t or F	p value
Age (years)	≤50	18 (15.0)	135.88±17.94	1.407	0.244
	51–60	34 (28.3)	145.54±14.58		
	61–70	45 (37.3)	143.85±19.59		
	>70	23 (19.2)	146.36±17.37		
Gender	Male	104 (86.7)	143.75±17.63	−0.184	0.854
	Female	16 (13.3)	144.63±17.94		
Education	Below primary school	30 (25.0)	140.37±17.69	1.170	0.324
	Junior high school	37 (30.8)	142.41±18.77		
	Senior high school	32 (26.7)	145.47±14.20		
	Post-secondary and above	21 (17.5)	149.00±19.70		
Marital status	Married	105 (87.5)	143.99±17.40	1.392	0.253
	Divorced	3 (2.5)	128.00±8.72		
	Widowed	12 (10.0)	146.75±19.88		
Occupation	Unemployed	10 (8.3)	135.50±13.18	1.416	0.247
	Retired	57 (47.5)	145.58±18.22		
	Employee	53 (44.2)	143.60±17.44		
Monthly income (RMB)	Less than 1,000	12 (10.0)	132.83±13.45	4.426	0.006
	1,000–1,999	18 (15.0)	136.11±24.25		
	2,000–2,999	34 (28.3)	144.12±14.47		
	3,000 or above	56 (46.7)	148.57±16.05		
Living place	Village	17 (14.2)	132.18±21.17	−3.058	0.003
	City	103 (85.8)	145.80±16.26		
Insurance	Employment-linked insurance	89 (74.2)	145.88±16.68	1.961	0.124
	Residents basic health insurance	13 (10.8)	142.08±26.35		
	New rural co-operative medical system	14 (11.7)	134.50±12.65		
	No	4 (3.3)	137.75±7.54		
Hypertension	Yes	70 (58.3)	143.47±17.50	−0.290	0.770
	No	50 (41.7)	144.42±17.90		
Diabetes	Yes	24 (20.0)	146.25±18.01	0.740	0.461
	No	96 (80.0)	143.27±17.54		
Smoking	Yes	70 (58.3)	141.43±16.73	1.653	0.196
	No	29 (24.2)	146.84±20.15		
	Ex-smoker	21 (17.5)	147.90±16.06		
Drinking	Yes	52 (43.3)	143.54±13.59	0.021	0.979
	No	60 (50.0)	144.03±20.81		
	Ex-drinker	8 (6.7)	144.75±16.32		
BMI (kg/m^2)	<18.5	2 (1.7)	119±0.00	1.538	0.208
	18.5–23.9	49 (40.8)	143.96±21.15		
	24.0–27.9	52 (43.3)	145.35±15.61		
	≥28	17 (14.2)	142.00±9.82		
Years since diagnosis (months)	<1	83 (69.2)	141.54±17.22	2.577	0.080
	1–12	13 (10.8)	146.85±16.88		
	>12	24 (20.0)	150.29±18.14		
Diagnosis	Stable angina	25 (20.8)	151.40±16.18	5.157	0.007
	Unstable angina	41 (34.2)	145.95±13.89		
	Myocardial infarction	54 (45.0)	138.80±19.36		
Living arrangement	Live with others	109 (90.8)	144.77±17.90	1.788	0.076
	Live alone	11 (9.2)	134.91±11.21		
Previous PCI	Yes	13 (10.8)	148.92±8.35	1.944	0.062
	No	107 (89.2)	143.25±18.34		

BMI = body mass index; HPLP = Health Promoting Lifestyle Profile; PCI = percutaneous coronary intervention; SD = standard deviation.

Table 2. HPLP II scores and subscale scores (n=120)

Subscale	Mean±SD	Range	Possible range	Items
Interpersonal relations	26.43±3.81	13–36	9–36	9
Nutrition	24.49±3.68	16–34	9–36	9
Health responsibility	23.17±3.71	9–32	9–36	9
Physical activity	20.01±4.47	10–30	8–32	8
Stress management	22.93±3.60	10–30	8–32	8
Spiritual growth	26.84±4.34	10–30	9–36	9
Total HPLP II score	143.87±17.60	68–190	52–208	52

HPLP = Health Promoting Lifestyle Profile; SD = standard deviation.

Table 3. Distribution of level of health-promoting lifestyle (n=120)

Health-promoting lifestyle level	Score	Number (%)
Weak	≤104	2 (1.7)
Moderate	105–156	89 (74.2)
Excellent	≥157	29 (24.2)

The total and subscale scores for the HPLP II are shown in **Table 2**. The average score of the total HPLP II was 143.87±17.60 (range, 68–190). In the subscales, participant scores were the highest in spiritual growth (26.84±4.34), followed by interpersonal relations (26.43±3.81), nutrition (24.49±3.68), health responsibility (23.17±3.71), and stress management (22.93±3.60), with physical activity scores being the lowest (20.01±4.47).

The evaluation of health-promoting lifestyle shows that most participants (n=89, 74.2%) have moderate level of health-promoting lifestyle (**Table 3**).

The relationships between HPLP II scores and socio-demographic and disease-specific characteristics are presented in **Table 1**. When analyzing the HPLP II score based on demographic and disease-specific characteristics, significant differences in HPLP II score were found with regard to monthly income (RMB), living place and diagnosis ($p < 0.05$). The group that earned 2,000 RMB or above each month had a higher mean score on the HPLP II than the group with less than 1,000 RMB. Participants living in villages tended to have a lower mean HPLP II score. Participants diagnosed with stable angina showed a greater mean HPLP II score than patients diagnosed with myocardial infarction. Age, gender, education, marital status, occupation, insurance, hypertension, diabetes, smoking, drinking, BMI (kg/m²), years since diagnosis, living arrangement, and previous PCI showed no relationship with a health-promoting lifestyle.

Table 4 shows factors that affect health-promoting lifestyle behaviors. Multiple linear stepwise regression analysis was performed with monthly income (RMB), living place and diagnosis to ascertain what extent the variable affect health-promoting lifestyle of patients after PCI, as well as the relative contribution of each variable. The results showed that monthly income (RMB) and diagnosis, but not living place, are important factors that affect health-promoting lifestyle behaviors.

Table 4. Factors influencing a health-promoting lifestyle (n=120)

Variable	Unstandardized B	SE	β	t	p value
Constant	126.574	5.001	-	25.310	<0.001
Monthly income (RMB)	5.750	1.458	0.329	3.943	<0.001
Diagnosis	−6.708	1.886	−0.296	−3.557	<0.001

Total sample: F=13.574, $p < 0.001$, $R^2 = 0.188$.
SE = standard error.

DISCUSSION

Individuals should be capable of implementing health-promoting lifestyle behaviors. A health-promoting lifestyle plays a significant role in reducing the burden of CAD. The objective of this study was to explore health-promoting lifestyle and the related factors among patients with CAD after PCI. Our results provide a glimpse of health-promoting lifestyle among Chinese patients. In this study, we find that 24.2% of the patients have an excellent level of health-promoting lifestyle, while 74.2% of the patients have a moderate level of health-promoting lifestyle.

The average item scores in the HPLP II subscales indicate that spiritual growth has the highest score, while the score for physical activity and stress management are among the lowest. Patients in this study do not take part in physical activity regularly and lack stress management skills. This result is consistent with previous studies,[7)9)19)] which show the same pattern of scores. The American Heart Association and American College of Cardiology Foundation suggest that patients with CAD engage in 30 to 60 minutes of aerobic exercise per day (e.g., walking breaks at work, gardening, household work) for least 5 days or preferably 7 days per week to improve cardiorespiratory fitness.[20)] Studies also show that taking part in regular physical activity can help improve patients' weight, mental health and quality of life.[21)22)] However, only 35% of the patients get an adequate level of physical activity,[23)] this phenomenon does not occur in patients with CAD. Other studies on pregnant women in Turkey and 300 students in Iran also found the lowest scores in physical activity among all HPLP elements.[10)24)] Cultural, health care system and personal factors also have great influence on the amount of physical activity for patients with CAD.[7)25)] The heart is one of the most important organs of the human body in Chinese culture. To prevent a heart attack, most Chinese patients after PCI were suggested to have enough rest to achieve balance (e.g., have a walk after meals). An international study also showed that 46% of patients have reduced physical activity after a diagnosis of CAD.[25)] China is a country with a large population; it is necessary to make more effort to spread CAD-related knowledge to common people and provide more facilities to help patients maintain a healthy lifestyle. Therefore, nurses should pay attention to patients' personal needs while taking culture and social environment into consideration when helping patients develop health-promoting behaviors.

Stress can occur as a result of depression, anxiety, social isolation, lack of quality social support, acute and chronic life events (e.g., bereavement, earthquakes), psychosocial work characteristics (e.g., work stress, job strain, shift work), type A behavior and hostility.[26)] Depression and social isolation are important risk factors for CAD, which are different from the conventional independent risk factors such as smoking and hypertension.[26)] There is consistent evidence showing that some aspects of work stress, job strain, and shift work are correlated with a slightly increased risk of developing CAD.[27)]

Spirituality might be a vital cultural asset for controlling disease-related anxiety, depressive symptoms and anger.[28)] The participants in the research reported the highest level of spiritual growth related to social interactions, emotional support and well-being.[29)] A study found that the degree of spiritual well-being may be an important factor in the development of CAD, which was significantly associated with low rates of progression of coronary artery obstruction.[30)]

The general characteristics of the patients are also closely related to a health-promoting lifestyle. This study reveals that patients after PCI who have a higher monthly income (RMB)

level are associated with higher level of health-promoting behavior. This indicates that the patient's economic situation is an important factor for providing the means to see a doctor and receive medications. CAD is a chronic disease that requires long-term treatment, which could be a stressful event for the patients, especially for patients with low incomes.

In addition, we find that patients diagnosed with stable angina have a higher level of health-promoting lifestyle than patients diagnosed with myocardial infarction. A healthy lifestyle is inversely proportional to the severity of the disease.

Living place had no significant relationship with a health-promoting lifestyle. With the changing developments in society, China has sped up its urbanization process. As the urban population increases continuously, the gap between urban and rural life may get smaller and smaller.

This study only used a convenient sampling of patients from one hospital in China. Therefore, the results of this study may not represent all patients with CAD after PCI.

In conclusion, in this study, patients with CAD after PCI were found to engage in health-promoting lifestyle behaviors at a moderate level. We should focus on physical exercise and stress management for patients with CAD. A health-promoting lifestyle in CAD is related to 2 basic factors, which are monthly income and diagnosis. Thus, healthcare providers need to keep an eye out for patients with low income and severe illness to encourage a health-promoting lifestyle.

ACKNOWLEDGEMENTS

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