Cardiac Emergency Prevention Through Personal and Environmental Factors

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Abstract

Cardiovascular disease is the number one cause of death for non-communicable diseases. There are many types of cardiovascular disease, but the most common and well-known one is Coronary Heart Disease. Those who are diagnosed with coronary heart disease need to always be vigilant since it is highly possible for them to experience the cardiac emergency at any time, which can cause death. This study aims to determine how the efforts to prevent coronary heart disease patients against cardiac emergency through personal and environmental factors. The results of this study are expected to improve the quality of health services in coronary heart disease patients and increase the efforts of preventing cardiac emergencies in the patients with coronary heart disease independently. There were 118 patients with a medical diagnosis of coronary heart disease as the sample of this study. It utilizes the observational analytic method with cross sectional research design. The analysis technique used was variance or component-based Structural Equation Modeling (SEM). The results showed that there were coronary heart disease patients who had suffered from the disease for more than 1 (one) year (87.3%), had comorbidities: hypertension or diabetes mellitus (85.6%), had experienced a chest pain (79.7%), had a hereditary factor of heart disease (69.5%), and had a healthy lifestyle (69.9%). The results of the structural model analysis between personal factors and environmental factors indicate that there is a significant influence on preventing the cardiac emergencies.

Keywords: cardiac emergency; personal; environmental

Introduction

In Indonesia, non-communicable diseases increase every year causing more than 36 million people to pass away (63% of all deaths)¹. The number one cause of the death for non-communicable diseases in general is cardiovascular disease. It is a disease associated with the heart and blood vessel abnormalities. There are many types of cardiovascular disease, but the most common and well-known one is Coronary Heart Disease. Coronary Heart Disease is a heart function disorder due to lack of blood in the heart muscle caused by the narrowing of the coronary arteries. It is clinically characterized by the chest pain or discomfort feeling in the chest. Sometimes, there is a heavy pressure in the chest while doing strenuous work, walking in a hurry or walking too far. It is defined as coronary heart disease if someone has been diagnosed with angina pectoris and / or myocardial infarction by a doctor, or has never been diagnosed with coronary heart disease but has experienced symptoms / history of the chest pain / feeling of pressure, severe / discomfort in the chest, pain / discomfort in the middle of the chest / front left chest / which spreads over the left arm, pain / discomfort in the chest felt while climbing / climbing stairs / walking in a hurry, and pain / discomfort in the chest which disappears when stopping the activity / taking a rest². Sudden deaths caused by the heart disease represent about 25-30 percent of all cardiovascular deaths, and are estimated to cause 70,000 to 90,000 deaths each year³. The cardiovascular system is very vital, therefore it should always be treated in order to stay healthy and be able to function normally. The prevalence of heart disease (doctor diagnostics) at all ages by province in 2018 is 1.5 million.
Those who are diagnosed with coronary heart disease need to always be vigilant since it is highly possible for them to experience the cardiac emergency at any time, which can cause death. The phenomenon of sudden death was the only manifestation of disease in almost half of all subjects with myocardial infarction(4),(5). Most sudden deaths occur before the patient is hospitalized(3). The results of this study indicate that the patients with coronary heart disease are at risk of having a heart attack in any kind of situations(6). The death occurs due to the patients not getting any help or handling late. When a cardiac emergency arrest occurs, the patients must immediately get help either from themselves or others because if they are not treated immediately, they can get into a worse condition or death. The cardiac emergency can occur anywhere, and at any time. Sometimes it happens when the patient is alone.

An effective approach to prevent the cardiac emergencies must be undertaken for individuals at risk followed by risk factor control(7),(8). Therefore, the patients must be treated thoroughly since they are diagnosed with the coronary heart disease. It is not only about the treatment, but they must be able to prevent, anticipate and help themselves in the event of an attack, so they can avoid the death.(9)

This study aims to determine the efforts of preventing the coronary heart disease patients against cardiac emergencies through personal and environmental factor approaches. The results of this study are expected to improve the quality of the health services in coronary heart disease patients and increase the efforts of preventing the cardiac emergencies in the patients with coronary heart disease independently.

Materials and Method

The subjects in this study were 118 patients with a medical diagnosis of coronary heart disease. Research location was Polyclinic of Cardiovascular, Dr. Soetomo Hospital, Surabaya, a tertiary referral hospital that prioritizes broad sub-specialist and sub-specialist services. Time of research was July to August 2017.

This research utilized observational analytic method; a research approach without intervening the population in data collection. The analytic intended in this study was an explanation of the influence between variables. This study applied a cross sectional design where all variables were measured at the same time. These were the variables that influence the process of prevention of cardiac emergency, including personal factors and environmental factors (Figure 1).

![Figure 1. Research Conceptual Framework](image)

The data were collected using a closed questionnaire and analyzed descriptively and inferentially. The results of the observations on 118 will then be analyzed. The analysis technique used is a structural equation model of variance or component-based Structural Equation Modeling (SEM).

Results

Personal factors in this study were measured through 5 indicators, namely: duration of illness, chest pain, presence of comorbidities, hereditary diseases and lifestyle. The complete data can be seen at Table 1.
The results showed that there were Coronary Heart Disease patients who had suffered from the disease for more than 1 (one) year (87.3%), had comorbidities: hypertension or diabetes mellitus (85.6%), had experienced a chest pain (79.7%), had a hereditary factor of heart disease (69.5%), and had a healthy lifestyle (69.9%).

Environmental factors are constructed by two indicators: family support and health services which can be seen in table 2.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Support</td>
<td>118</td>
</tr>
<tr>
<td>Health Services</td>
<td>118</td>
</tr>
</tbody>
</table>

The results of the 2 indicators of the environmental factors showed that half (55.1%) of Coronary Heart Disease patients received a good family support, while the health service indicator was more in the unfavorable category.

The results of the analysis to see the measurement model (outer model) by testing the construct validity and construct reliability are shown in Table 3.
Table 3. The Results of Convergent Validity Test

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Indicators</th>
<th>Convergent Validity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Loading Value</td>
</tr>
<tr>
<td>Personal Factor (X1)</td>
<td>Duration of illness</td>
<td>0.902</td>
</tr>
<tr>
<td></td>
<td>Chest pain attacks</td>
<td>0.804</td>
</tr>
<tr>
<td></td>
<td>Heredity factors</td>
<td>0.777</td>
</tr>
<tr>
<td></td>
<td>Comorbidities</td>
<td>0.827</td>
</tr>
<tr>
<td></td>
<td>Lifestyle</td>
<td>0.7050</td>
</tr>
<tr>
<td>Environmental factor (X2)</td>
<td>Family support</td>
<td>0.909</td>
</tr>
<tr>
<td></td>
<td>Health services</td>
<td>0.743</td>
</tr>
</tbody>
</table>

The convergent validity test results explain that the factor loading value of the indicator is >0.5 and all indicators are significant for measuring the factor variables (T-statistic is more than 1.96). The conclusion of the analysis is that the above indicators are valid for measuring the latent variables and showing the criteria of goodness of a measurement model (outer model).

Structural model analysis is performed to examine the effect of the exogenous factors on the endogenous factors. The value used as a reference is the T-table value (109; 0.025 = 1.96) with margin of error (α) = 5%. The results of the full significance test are explained in the following table.

Table 4. Significance Test Results on the Structural Model (Inner Model)

<table>
<thead>
<tr>
<th>Path</th>
<th>Path parameter coefficient</th>
<th>Test of Relationship Significance</th>
<th>Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>(X1) Personal factor → (X3) Stressor assessment</td>
<td>0.215</td>
<td>T-Statistics</td>
<td>2.099</td>
</tr>
<tr>
<td>(X2) Environmental factor → (X3) Stressor assessment</td>
<td>0.309</td>
<td>T-Statistics</td>
<td>3.374</td>
</tr>
<tr>
<td>(X2) Environmental factor → (X1) Personal factor</td>
<td>0.374</td>
<td>T-Statistics</td>
<td>5.221</td>
</tr>
<tr>
<td>(X3) Stressor assessment → (Y) Cardiac Emergency Prevention</td>
<td>0.273</td>
<td>T-Statistics</td>
<td>3.179</td>
</tr>
</tbody>
</table>

Based on the structural model test results using the T test, all the T-statistic values are greater than the T-table. The conclusion is that there is a significant influence between exogenous factors and endogenous factors.

Discussion

The majority of coronary heart disease patients have been suffering from this disease for more than a year and have experienced chest pain. The acute coronary syndrome is caused by the imbalance between myocardial oxygen demand and supply which causes cell death and myocardial necrosis. The pain is experienced due to lack of oxygen in the heart muscle. If this condition is not resolved immediately, it will cause arrhythmia that is very likely to occur the cardiac emergency. Suffering from particular pain for a long time and having experienced chest pain is an unfavorable condition since it can have a psychological impact on the patient. It may cause boredom for individuals to undergo therapy. The
experience of chest pain is an unpleasant condition for the patient and a stressor\(^\text{(11)}\). The psychological disorders experienced by the coronary heart disease patients will affect the treatment, especially in undergoing the treatment of the regular diet. The majority of the patients have comorbidities such as hypertension, diabetes or hyper cholesterol. Hypertension is one of the factors causing coronary heart disease. The 50% of myocardial infarction suffer from hypertension and 75% of them suffer from left ventricular failure due to the hypertension\(^\text{(12)}\). High and persistent blood pressure will cause direct trauma to the coronary artery walls. Diabetes is one of the predispositions to vascular disease. Men who suffer from diabetes have a 50% higher risk of illness than normal people, while women have a double risk\(^\text{(13)}\). Hypercholesterolemia is a major factor in coronary heart disease. The blood cholesterol level is affected by the daily composition of food. The patients who have comorbidities have a higher risk of experiencing cardiac emergency. Therefore, the intensive care needs to be done such as taking medication regularly, controlling blood sugar, maintaining the blood pressure, and choosing a healthy lifestyle\(^\text{(14)}\). In addition, the patients who experience diabetes or hypertension are at risk for coronary heart disease\(^\text{(14),(15),(16)}\). Several studies have shown that genetic factors predispose to the sudden death\(^\text{(4)}\). In recent years, the cardiovascular disease inherited due to genetic basis reaches more than 50% and can cause sudden cardiac death\(^\text{(16)}\).

Family support is necessary in treating coronary heart disease patients, especially in terms of taking medication regularly, doing routine medical check-ups at the hospital, helping to provide food according to the patients’ diet, and supporting regular exercise. The results showed that half of the Coronary Heart Disease patients have good family support. This support is needed for the patients to take care of themselves better and avoid the cardiac emergencies. The coronary heart disease patients have to take the medication regularly and have a healthy lifestyle. They need to get an intensive care by doing routine medical check-ups which include blood pressure, blood sugar, and blood fat levels\(^\text{(14)}\). Furthermore, half of the coronary heart disease patients do not have good family support. Therefore, they try to overcome their health problems independently. The family does not provide support for regular medical check-ups to the hospital in which the patients need to go alone and take care of themselves. This condition is not good since they need support from the family to live a life with the illness. The deaths from coronary heart disease can be prevented up to 80% by regular medical check-ups\(^\text{(14)}\).

The results of the research on the health services received by the patients with coronary heart disease showed that more than half of them stated that the services provided were not good. It is related to the lack of health education received by the patients with coronary heart disease, especially in terms of indications and symptoms of the heart attacks, as well as actions that must be taken when an attack occurs. The discussion results with the experts indicate that there is no Standard Operating Procedure (SOP) related to the health education for coronary heart disease patients from both the nursing and medical professions. Some of the doctors or nurses have conducted the health education, limited to their abilities and to answer the patient questions. If the patient does not give any question, the doctor or nurse does not give explanation, so the counseling varies both in quality and quantity.

Based on the results of the structural model analysis between personal factors and environmental factors, the T-statistic value (3.374) is greater than the T-table (1.96) which means that there is a significant influence between personal factors and environmental factors in preventing cardiac emergencies.

**Conclusion**

Patients with coronary heart disease are at risk for recurrent attacks of chest pain that can lead to cardiac emergencies. The personal factors including the duration of illness, chest pain attacks, the presence of comorbidities and hereditary diseases, as well as the environmental factors in the form of family support and good health services are very influential in the treatment of coronary heart disease patients to prevent the cardiac emergencies.

**Ethical Clearance:** Yes

**Source of Funding:** Authors

**Conflict of Interest:** No

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