

UNIVERSITI PUTRA MALAYSIA

PREFERENCE FOR GREEN OUTDOOR ENVIRONMENT OVER INDOOR SPACES BY CARDIAC SURVIVORS WITH WALKING AS A REHABILITATIVE ACTIVITY

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FRSB 2017 18



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NUR SYAKIRA AMIRA BINTI AMAT

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

April 2017

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DEDICATION

This thesis is fully dedicated to my parents, Amat Ali and Suriati Mansah. Thank you for all your endless support and love. The preparation of the thesis, with the chance to study on the topic of therapeutic garden, had made me appreciate health and cherish what I have and to be grateful with what Allah had bestowed upon me.

"...Love your life and what you've been given, it is not accidental. Search for your purpose and do it best you can..."



Bonnie Mohr

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

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By

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April 2017

Chairman:Shureen Faris Abdul Shukor, PhDFaculty:Design and Architecture

Heart disease is the number one killer in Malaysia and alarmingly, the numbers of cardiac survivors are increasing throughout the year. Currently, the cardiac rehabilitation activity is mostly being carried out in the Department of Rehabilitation located inside a building rather than utilising the green outdoor environments which can be found within the hospitals' compounds. Furthermore, the green outdoor environments are hardly meet the requirements or preferences to be utilized for cardiac rehabilitation purposed and there is still a lack of study on the use of green outdoor environments for cardiac rehabilitation. The main purpose of this study is to identify if the Green Outdoor Environment (GOE) is influencing the cardiac survivors' physiological responses that consist of heart rate (bpm) and blood pressure (mmHg) during the cardiac rehabilitation sessions. Therefore, there are few objectives established which are to assess the physiological responses of cardiac survivors during the walking exercise carried out during the outdoor and indoor sessions, to identify the respondents' preferences for an ideal outdoor setting of green outdoor environments, and to recommend the design of outdoor spaces for cardiac rehabilitation usage at hospitals. This study was carried out at the Medical Rehabilitation Department of Rehabilitation Medicine, Serdang Hospital which provides a rehabilitation treatment program for the cardiac survivors called Cardiac Rehabilitation Program (CRP). Forty cardiac survivors who completed all six-week treatments involved with the outdoor and indoor sessions were chosen as the respondents. The walking exercise was selected as the comparative activities between the outdoor session and indoor session. Walking distance without obstacles represents the outdoor session while walking on the treadmill represents the indoor session. The readings of cardiac survivors' physiological responses (heart rate and blood pressure) collected from the exercise record during CRP. A questionnaire was given to identify their preferences regarding the ideal outdoor setting of GOE during reassessment session of CRP and the design considerations of green outdoor environments. The preferences were divided into the type of settings, landscape features and leisure activities that can be done outdoor. The results were coded into the Statistical Package for Social Science (SPSS) Version 22 and analysed by using one-way analysis of variance (ANOVA). The results from the findings indicated that outdoor session has influenced the heart rate readings of the cardiac survivors but not in the readings of their blood pressure. However, the readings of heart rate and blood pressure of the cardiac survivors were not influenced by the indoor session. Most of the cardiac survivors preferred to have a more nature-based surrounding for their comfort and as according to them; the setting provided the positive vibes during the outdoor session of rehabilitation. This has shown that an ideal outdoor setting is important for the cardiac survivors in a positive way and the cardiac survivors' preferences also should be taken into consideration regarding the design of green outdoor environments.

Keywords: healing garden, Malaysian hospital, therapeutic landscape

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

KEUTAMAAN UNTUK PERSEKITARAN LUARAN HIJAU TERHADAP RUANG DALAMAN OLEH PESAKIT JANTUNG DENGAN BERJALAN SEBAGAI AKTIVITI PEMULIHAN

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Penyakit jantung adalah pembunuh nombor satu di Malaysia dan lebih merisaukan lagi apabila bilangan pesakit jantung semakin meningkat setiap tahun. Kini, aktiviti pemulihan jantung kebanyakannya dijalankan di dalam bangunan Jabatan Rehabilitasi berbanding menggunakan persekitaran luaran hijau yang terdapat di sekitar hospital. Tambahan pula, persekitaran luaran hijau semasa adalah tidak menepati keperluan atau keutamaan untuk kegunaan pemulihan jantung dan kajian tentang penggunaan persekitaran luaran hijau bagi pemulihan jantung adalah kurang. Tujuan utama kajian ini adalah untuk mengenalpasti sama ada persekitaran luaran hijau mempengaruhi tindak balas fisiologi pesakit jantung yang merangkumi kadar degupan jantung (bpm) dan tekanan darah (mmHg) ketika pemulihan jantung dijalankan. Dengan itu, terdapat beberapa objektif yang ditubuhkan iaitu untuk menilai tindak balas fisiologi pesakit jantung semasa senaman berjalan kaki yang dilaksanakan ketika sesi luaran dan sesi dalaman, untuk mengenalpasti pilihan pesakit jantung untuk persekitaran luaran hijau yang ideal dan untuk mencadangkan reka bentuk ruangan luar bagi kegunaan pemulihan jantung di hospital-hospital. Kajian ini dijalankan di Jabatan Perubatan Rehabilitasi, Hospital Serdang yang menyediakan program rawatan mulihan kepada pesakit jantung yang dinamakan Program Rawatan Jantung. Empat puluh pesakit jantung yang telah menyelesaikan rawatan bagi sesi luaran dan dalaman selama enam minggu telah dipilih sebagai responden. Senaman berjalan kaki telah dipilih sebagai aktiviti perbandingan di antara sesi luaran dan sesi dalaman. Berjalan tanpa halangan mewakili sesi luaran manakala berjalan di atas treadmill mewakili sesi dalaman. Bacaan bagi tindakbalas fisiologi pesakit jantung (degupan jantung dan tekanan darah) dikumpulkan dari rekod latihan semasa CRP. Borang kaji selidik telah diberikan bagi mengenalpasti bagi persekitaran luaran hijau yang ideal semasa sesi penilaian semula dalam Program Rawatan Jantung dan rekabentuk yang diambil kira bagi persekitaran luaran hijau terbahagi kepada jenis-jenis aturan, ciri-ciri lanskap dan aktiviti-aktiviti waktu lapang yang boleh dilakukan di luar setelah itu dianalisis. Setelah itu, segala keputusan dikodkan ke dalam Statistical Package for Social Science (SPSS) Version 22 dan dianalisis dengan menggunakan one-way analysis of variance (ANOVA).

Keputusan dari kajian menyatakan bahawa sesi luaran mempengaruhi bacaan kadar degupan jantung pesakit tetapi yang sebaliknya terjadi terhadap bacaan tekanan darah. Bacaan kadar degupan jantung dan tekanan darah pesakit tidak dipengaruhi oleh sesi dalaman. Kebanyakan para pesakit jantung memilih untuk mempunyai persekitaran yang berunsurkan alam semula jadi untuk keselesaan dan sebagai keadaan yang positif mereka ketika sesi luaran. Ini menunjukkan bahawa persekitaran luaran hijau yang ideal adalah sangat penting untuk pemulihan jantung kerana ianya memberi kesan kepada tindak balas fisiologi para pesakit jantung dengan cara yang positif dan pilihan daripada para pesakit jantung juga haruslah diambil kira mengenai reka bentuk persekitaran luaran hijau.

Kata kunci: hospital di Malaysia, lanskap terapeutik, taman penyembuhan



ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my main supervisor, Dr. Shureen Faris Abdul Shukor for her guidance, commitment and support in my study. To my cosupervisor, Dr. Suhardi Maulan, thank you for all those helpful comments and guidance during the thesis preparation. May The Almighty grants all of you the best for all the kindness and help that been given to me throughout this Master's degree journey.

I would also like to take this opportunity to thank the staff and the cardiac survivors from the Department of Rehabilitation at Serdang Hospital for the cooperation and kindness for helping me during the data collection process.

Lastly, to all of my helpful friends, I thank you.

I certify that a Thesis Examination Committee has met on 27th April 2017 to conduct the final examination of Nur Syakira Amira Binti Amat on her thesis entitled " Preference for Green Outdoor Environment Over Indoor Spaces by Cardiac Survivors with Walking as a Rehabilitative Activity " in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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CHAPTER 1

INTRODUCTION

Cardiovascular diseases have been the leading cause of mortality worldwide based on the report by World Health Organisation (WHO) in 2011. Coronary artery disease is one of the cardiovascular diseases that had highest number of cases of death in the general population (McCullough, 2007), and it is a disease that has burdened the world all over (Tunstall-Pedoe et al., 2000). Cardiovascular diseases kill 17.3 million people a year, and the number is expected to grow to more than 23.6 million by 2030 (American Heart Association, 2014). The statistics in 2008 compiled by the American Heart Association showed that 30 percent of all global deaths were caused by cardiovascular diseases, and 80 percent of these deaths took place in low- and middle-income countries (ibid) whereby, Turkmenistan recorded the highest death rate with 712 deaths per 100,000 people. Kazakhstan had the second highest rate with 635 deaths per 100,000 while Mongolia, Uzbekistan, Kyrgyzstan, Guyana, Ukraine, Russia, Afghanistan, Tajikistan and the Republic of Moldova recorded more than 500 deaths per 100,000 (Myers, 2015). Nearly 787,000 Americans died from a heart disease, stroke and other cardiovascular diseases in 2011, indicating that cardiovascular diseases were responsible for every one out of three deaths in America (American Heart Association, 2014).

In Malaysia, cardiovascular diseases have remained as the number one killer for 27 years (Ravendran, 2009). According to WHO (2014), death caused by coronary heart disease in Malaysia reached 29,363 or 23.10% of total deaths in Malaysia, ranking it at number 33 in the world among countries inflicted with coronary heart disease.

Based on the statistics given, cardiovascular disease has indeed, for years, claimed many lives all over the world.

1.1 Background of the Study

As issues related to cardiovascular diseases are becoming the world's concern, a lot of prescriptions have been suggested by healthcare teams, especially doctors. One of the prescriptions is coming up with a cardiac rehabilitation programme. Generally, a cardiac rehabilitation programme provides various benefits for patients with regard to their physical and psychological health such as improving their psychosocial well-being and managing their stress (Taylor, 2016).

Most of the treatments carried out at cardiac rehabilitation centres were done indoor instead of utilising the existing green outdoor environment. The idea of a 'Green Outdoor Environment' (GOE) was first coined by Faris (2012) who suggested that gardens, courtyards and roof top gardens at hospitals could be used for rehabilitation treatments. Patients gain plenty of benefits when they exercise or undergo cardiac rehabilitation at a GOE. Sufficient evidence has indicated that natural environment plays an important role

in supporting people's health and well-being (Faris et al., 2016), and this indicates the importance of an ideal GOE in aiding patients.

Therefore, this study assessed the cardiac survivors' responses towards the rehabilitation treatment known as the Cardiac Rehabilitation Programme (CRP) available at the hospital. The rehabilitation treatment programme consists of two sessions: an outdoor session and an indoor session that utilises the Green Outdoor Environment (GOE) at Serdang Hospital throughout the session.

The results were obtained through the patients' physiological responses indicated from the readings of their heart rate (bpm) and blood pressure (mmHg). Other than the indication in physiological responses, this study also looked into the cardiac survivors' preferences for an ideal outdoor setting of a green outdoor environment. Currently, the GOE at the outdoor rehabilitation area is treated as a 'back' space as the air conditioner condensers are also placed at the location as shown in Figure 1.1. The sound produced by the condenser could interrupt the cardiac survivors during the outdoor session of rehabilitation and lessen the aesthetic value of the GOE. Hence, this study sought to determine the characteristics of an ideal GOE viewed by the cardiac survivors while undergoing the cardiac rehabilitation programme.



Figure 1.1: The view of part of the GOE of Serdang Hospital where the air conditioner condensers were placed (Source: Author)

The findings of the study would confirm or reject the hypotheses of the study regarding GOEs.

1.2 Problem Statement

This study was carried out at the Medical Rehabilitation Department at Serdang Hospital. Currently, the cardiac rehabilitation programme mostly utilises the tools found in the rehabilitation department instead of making full use of the outdoor environment located within the hospital areas (Faris et al., 2016) despite many studies that have proven that natural environment could contribute positively in the healing process of a patient. Most cited research have shown that surgical patients assigned to rooms with windows looking out on a natural scene had shorter postoperative hospital stays, received fewer negative evaluative comments in nurses' notes and took fewer potent analgesics compared to patients in similar rooms with windows facing a brick building wall (Ulrich, 1984). However, the existing GOEs at Serdang Hospital hardly met the quality of restorative environment as evaluated by using the Common Design Recommendation (CDR) tool (Fathirah & Faris, 2015). Based on the findings of the study, recommendations were given for restorative GOEs at hospitals in Malaysia. These include improvements on location and view, accessibility, layout and space, seating arrangement, planting, design details and practical services. Nevertheless, these recommendations were generally meant for general users (staff, visitors and patients) and not specifically for the cardiac survivors who use GOEs for cardiac rehabilitation. The GOEs provided at the hospital should be designed according to the necessities or preferences of the cardiac rehabilitation patients. Unfortunately, there is still a lack of study on the use of GOEs for cardiac rehabilitation, especially in Malaysia.

1.3 Research Questions

The following research questions have been identified as important for this study:

- 1. What are the physiological responses shown by cardiac survivors during cardiac rehabilitation carried out during the outdoor and indoor sessions?
- 2. What are the cardiac survivors' preferences for an ideal outdoor cardiac rehabilitation setting of a green outdoor environment?
- 3. What are the suitable designs for outdoor spaces to be used for cardiac rehabilitation?

1.4 Significance of the Study

This study is an attempt to identify the influence of exercise in a GOE. The findings would further support the benefits of a GOE towards the rehabilitation of cardiac survivors and provide a sketch for an ideal setting to conduct the treatment for cardiac survivors at Malaysian hospitals.

1.5 Aim of Research

The study aimed to determine if the GOE influences the cardiac survivors' physiological responses such as the heart rate (bpm) and blood pressure (mmHg) during cardiac rehabilitation.

1.6 Research Objectives

The following objectives were established towards achieving the above goal:

- i. to assess the physiological responses of cardiac survivors during the walking exercise carried out during the outdoor and indoor sessions,
- ii. to identify the cardiac survivors' preferences for an ideal outdoor setting of green outdoor environment (GOE), and
- iii. to recommend the design of outdoor spaces for cardiac rehabilitation usage at hospitals.

1.7 Scope and Limitations of the Study

1.7.1 Hypothesis

Cardiac survivors require rehabilitation treatments to improve their daily routines to prevent another cardiac attack. This study assumed that GOEs could positively influence the physiological responses of cardiac survivors during the cardiac rehabilitation programme.

1.7.2 Scope

The study focused only on one type of disease which is heart disease and/or any complications that are related to the heart that require the patients to undergo a rehabilitation treatment. Data were collected from only one hospital which is the Serdang Hospital because it is one of the most referred hospitals for cardiovascular problems or diseases in Malaysia. As mentioned, a study regarding restorative green outdoor environments had been carried out at Serdang Hospital using a CDR tool (Fathirah & Faris, 2015) that focused on several criteria that must be included within a green outdoor environment in order for it to be considered as restorative. These include location and view, accessibility, layout and space, seating arrangement, planting, design details and practical services. Nevertheless, this study narrowed the scope to GOEs for cardiac rehabilitation purposes only. The Department of Rehabilitation Medicine had prepared a few sessions for the cardiac survivors during the CRP. However, only the data from the walking exercise were used for this study because walking exercise was the only assessment that was held both during the indoor and outdoor sessions which made it convenient for the study. The chosen assessment from the cardiac rehabilitation (CRP) 'walking distance without obstacles' represents the outdoor session, and 'treadmill exercise' represents the indoor session of the cardiac rehabilitation programme. Furthermore, the physiological responses of the cardiac survivors were the main focus in the assessment criteria of this study as several past studies had been carried out on psychological responses with GOE.

1.7.3 Limitations

Limited number of respondents (18 cardiac survivors out of 40) were assessed as not all the cardiac survivors underwent the walking exercise for both sessions (outdoor and indoor). Next, literature from previous studies indicated that discussions on the outdoor rehabilitation treatment of cardiac survivors and green outdoor environments were limited.

1.8 Definition of Terminologies

Cardiac survivors refer to patients who suffer from any type of heart diseases or complications and enrol themselves in a rehabilitation programme known as the Cardiac Rehabilitation Programme (CRP) at the Medical Rehabilitation Department at Serdang Hospital.

Green outdoor environment (GOE) is defined as the outdoor space utilised for the cardiac rehabilitation programme (outdoor session) by the cardiac survivors at Serdang Hospital. The garden is located at Level Two of the Hospital, next to the Medical Rehabilitation Department. The idea of a GOE was first coined by Faris (2012) who suggested that the gardens, courtyards and roof top gardens at hospitals in Malaysia could be used for a rehabilitation treatment.

Rehabilitation refers to the health care services that help a person keeps, restores or improves skills and carries out functions for daily living and skills related to communication that have been lost or impaired because a person was sick, injured or disabled (Marcy et al., 2012).

1.9 Summary

In summary, this chapter discusses issues related to cardiovascular diseases worldwide in general and Malaysia, specifically, that have led to the initiation of this study. Over the past three decades, studies conducted on the topic have revealed the benefits of a garden or the natural environment and how by staying within an outdoor environment or nature rendered lot of positive impacts especially to those who are recovering from sickness (Faris et al., 2016). Therefore, the study aimed at providing the evidence through the cardiac survivors' physiological responses that the GOEs have the ability to support cardiac rehabilitation as cardiac rehabilitation centres in Malaysia are utilising equipment provided inside the department's buildings more than the green outdoor environments (GOEs) found within the compound of the hospitals.

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