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#### THE EFFECTS OF MINDFULNESS INTERGRATION IN HOLISTIC CARDIAC REHABILITATION: A PILOT STUDY

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#### *Abstract*

The effective management of psychological is crucial and need to be started immediately after angioplasty. The Holistic Cardiac Rehabilitation (HCR) program was developed by incorporate psycho education, mindfulness breathing and relaxation technique. This pilot study was conducted to evaluate the HCR program's effect in reducing anxiety and depression among the patients. This one-month comparative study involved sixteen post angioplasty patients. The HCR group was subjected to HCR program and control group involved in standard cardiac rehabilitation (SCR) program. The interview was conducted using Hospital Anxiety and Depression Scale (HADS) and blood taking for serum cortisol was done detect the elevation of anxiety and depression level. Paired t-test showed statistically significant reduction of anxiety level on HADS ( $p=0.02$ ) and serum cortisol level ( $p=0.04$ ) in HCR group and not significant reduction in control group. Independent t-test showed statistically significant reduction of anxiety level in HCR group compare to control group which HADS ( $p=0.02$ ) and serum cortisol ( $p=0.05$ ). The reduction of depression level was not statistically significant in both groups. In conclusion, Holistic Cardiac Rehabilitation statistically significant in reducing anxiety and among angioplasty patient. A larger sample and quantitative study may prove the effectiveness of HCR program to improve psychological health of post angioplasty patients.

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**Keywords:** Cardiac rehabilitation, anxiety, depression, mindfulness, mindfulness breathing, relaxation technique.



## 1. Introduction

The increasing number of psychiatric problems in today's world is alarming. This problem is expected to increase and cause health problems that can lead to an increase in mortality rates, particularly in patients with coronary heart disease. Coronary heart disease (CHD) patients are at risk of psychiatry morbidity with a prevalence of anxiety and depression of approximately 15% to 32.5% (Asrenee, Fazirah, Suhairi, & Zurkurnai, 2007; Eng et al., 2011; Carvalho et al., 2016). About 33% – 64% of CHD patients experienced moderate to severe depression (Dixon, Lim, & Powell, 2000). These psychological problems can risk the patients for worsening the cardiovascular outcomes including myocardial infarction (MI), it also affects the treatment outcomes and increase mortality rate of CHD patients (Pogosova et al., 2014; Rothenbacher, Hahmann, Wusten, Koenig, & Branner, 2007).

Anxiety and depression among CHD patients were also associated with poor compliance of treatment that can lead to abnormalities in autonomic tone and patients were more susceptible to ventricular arrhythmias and increased platelet activation, which leads to coronary re-stenosis. Anxiety and depression in CHD patients were also associated with poor compliance of treatment that could contribute to autonomic tone disturbances and patients were more vulnerable to ventricular arrhythmias and increased platelet activation, resulting in coronary re-stenosis.

Previous data showed the increasing number of coronary revascularization procedure between CHD patients with mood disorder compare than CHD with mentally stable (Tacon, McComb, Caldera, & Randolph, 2003; Milani & Lavie, 2007). The effective management of depression in CHD patients. Therefore, it is very important and should be the priority to incorporation the psychological intervention in cardiac rehabilitation (Gullikson et al., 2011; Chang, Casey, Dusek, & Benson 2010).

Cardiac rehabilitation is a multidisciplinary intervention to help patients with CHD improve their physical, emotional and mental health. In order to address psychological problems of patients, Huffman, Celano, and Januzzi (2010) proposed CHD patients becoming involved to cardiac rehabilitation with combination of psychotherapy. A combination of psychotherapy components will make the cardiac rehabilitation program more comprehensive and suitable for the treatment of anxiety and depression to improve quality of life among CHD patients.

Previous study showed the effectiveness of psychological intervention in reducing level of anxiety among CHD patients (Richards, Anderson, & Jenkinson, 2018). Through previous studies relaxation therapy is one of the psychological interventions that has proven its effectiveness (Delui, Yari, Khouyinezhad, Amini, & Bayazi, 2013; Wilk & Turkoski, 2001). Various relaxation techniques have been used to reduce the level of anxiety among the patient such as yoga and music therapy. The empirical evidences of Islamic relaxation by listening to voice of Quran also showed a promising effect in reducing anxiety among CHD patients (Babaii, Abbasinia, Hejazi, Seyyed Tabaei, & Dehghani 2015; Mirbagher Ajorpaz, Aghajani, & Shahshahani, 2011). By hearing Quran, the alpha and theta waves activities improved. Alpha and theta waves of the brain play an important role in relaxation and calmness (Mustapha, Rani, Reza, Wan Daud, & Ghani, 2016).

In addition to relaxation techniques, mindfulness therapy has been identified to reduce the anxiety levels. Previous studies have found that Mindfulness-based stress reduction effective to reduce psychological problems. It is similar to Mindfulness-based cognitive therapy, which can help reduce the

level of patients stress, anxiety and depression (Vollestad, Sivertsen, & Nielsen, 2011; Nyklíček, Mommersteeg, Van Beugen, Ramakers, & Van Boxtel 2013; Van Son et al., 2013; Younge et al., 2015). Besides, Burg, and Michalak (2011) and Kim et al. (2013) have used Mindfulness Breathing in their study on depression and post-traumatic stress disorder patients. Mindfulness breathing is able to enhance an individual's ability to control their emotions to adapt with their current situation and environment, also involves of one's ability to pay attention on their present breathing. Thus, may reduce risk of mortality among CHD patients (Burg & Michalak, 2011; Burg, Wolf, & Michalak 2012). Therefore, *incorporating* psychological intervention such as relaxation technique and mindfulness breathing in cardiac rehabilitation program would offer a holistic approach in dealing with CHD patients.

## **2. Problem Statement**

CHD has significant psychological and economic implication in Malaysia. CHD patients' level of anxiety and depression has a significant impact on their treatment compliance and progress. The past problems experienced by anxious and depressed CHD patients may exacerbate their physical symptoms and subsequently effect their quality of life. These furthermore may increase morbidity and mortality rate. The increasing of morbidity and mortality may impact to the national development and increase burden of care of the population.

Nowadays, there is no specific psychological interventions which combines relaxation therapy and Mindfulness Breathing have been established and applied in cardiac rehabilitation to treat anxiety and depression among CHD patients. This study proposes a Holistic Cardiac Rehabilitation (HCR) program by incorporating psychological relaxation technique with mindfulness breathing. This holistic cardiac rehabilitation not only offers rehabilitation of physical health but also mental and spiritual health in the patients with CHD.

## **3. Research Questions**

Is the HCR program more effective than the Standard Cardiac Rehabilitation (SCR) program in reducing anxiety and depression among post angioplasty patients?

### **3.1. Hypothesis**

There is significant reduction in anxiety and depression level among post angioplasty patients who are attending HCR program compare to SCR program.

### **3.2. Null hypothesis**

There is no significant reduction in anxiety and depression level among post angioplasty patients who are attending Holistic Cardiac Rehabilitation program compare to Standard Cardiac Rehabilitation program.

#### **4. Purpose of the Study**

To assess the effect of Holistic Cardiac Rehabilitation (HCR) program in reducing anxiety and depression among post angioplasty patients.

#### **5. Research Methods**

##### **5.1. Subject and sampling methods**

Comparative study involved with 16 post angioplasty patients aged among 30 to 70 years old. Using convenience sampling, after explain the study procedure and consented, the sample will be allocated non-randomly into two groups (intervention group and control group). The control group will enter into the existing Standard Cardiac Rehabilitation (SCR) program and intervention group will enter HCR program. The HCR program has been developed through modified Delphi techniques involving 16 expert panels in related fields. HCR program consists of health education, physical exercise and mindfulness breathing which is combined with relaxation therapy by listening to Quranic verses. The program began with anxiety and depression assessment using Hospital Anxiety Depression Scale (HADS) and serum cortisol blood sampling for pre-intervention data. Then cardiac rehabilitation program has been conducted once a week for one month in both groups. After completing one-month program, assessment for anxiety and depression using HADS and blood sampling for serum cortisol will be taken for post intervention data.

##### **5.2. Outcome measures**

###### **HADS questionnaires**

HADS was developed by Zigmond and Snaith (1983) consisting of 7 simple questions. This scale is used to measure the level of anxiety and depression of the patient. Although calculating the level of anxiety and depression were combined in one table, the calculation needs to be done separately. The HADS questionnaire used in this study has been validated in Malay language with the cut off point was 8 or 9, Sensitivity 90.07% and specificity 86.2% for anxiety and sensitivity 93.2% and specificity 90.8% for depression. The validation that has been performed on this instrument has shown its suitability to use in this study (Fariza & Zahiruddin, 2015).

###### **Serum Cortisol**

Cortisol levels can be measured through urine, saliva and plasma. The levels of cortisol can be measured more accurately through plasma. The level of cortisol levels is very high about an hour after awakening and starts to decline until evening. The cortisol level reached nadir at midnight (Akerstedt & Levi, 1978; Stewart, Seeman, John, & Catherine, 2000; King & Hegadoren, 2002). In this study, serum cortisol investigation was sent to Hospital Universiti Sains Malaysia laboratory. Normal range for serum cortisol level were 166 – 507 nmol/L at 8am to 10am and 73.8 – 291 nmol/L at 4 pm to 6pm.

## 6. Findings

### 6.1. Demographics

Total 16 samples were included in this study, 8 male samples were allocated for intervention group and the other 8 male samples for control group.

### 6.2. Analysis

In this study, paired t tests were used to evaluate differences in the results obtained before and after interventions' data for both groups. Whereas post-intervention data for both groups were assessed using independent t test.

### 6.3. Pre and post intervention

Table 1 showed the result of paired t test for anxiety level, pre and post intervention. Anxiety level of HCR group was 11.88 prior to the intervention compared to 5.63 following the intervention, decreased by 6.25 with p value at 0.02. In contrast to 9.00 after intervention, the anxiety level before intervention for SCR group was 11.12 with p value of 0.08.

**Table 01.** Anxiety level pre and post intervention of HCR and SCR

Intervention	HCR Group	SCR group
Pre	11.88±0.91	11.12± 0.74
Post	5.63±0.63	9.00±1.20
Mean diff	6.25±1.25	2.12±1.10
P value	0.02	0.08

Table 2 showed the result of paired t test for depression level, before and after intervention. In HCR group, depression level was 8.75 before intervention compared to 6.75 after intervention, a reduction of 2.00 with the p value was 0.09. While depression level for SCR group was 8.75 before intervention compared to 9.37 after intervention, increased by approximately 0.63 with the p value was 0.60.

**Table 02.** Depression level pre and post intervention of HCR and SCR

Intervention	HCR Group	SCR group
Pre	8.75±1.25	8.75± 1.57
Post	6.75±0.73	9.37±1.33
Mean diff	2.00±1.05	-0.63±1.05
P value	0.09	0.60

Table 3 showed the paired t test, before and after intervention for serum cortisol level. A reduction of 47.12 with p value at 0.04, serum cortisol level was 233.13 before the intervention compared to 1.88.00 after the intervention. Meanwhile serum cortisol level for SCR group was 260.00 before intervention compared to 280.25 after intervention which increased by 20.25 with the p value at 1.61.

**Table 03.** Serum Cortisol level pre and post intervention of HCR and SCR

Intervention	Mean HCR Group	Mean SCR group
Pre	233.13±30.81	260.00± 19.64
Post	188.00±33.87	280.25±12.93
Mean Diff	47.12±11.15	- 20.25±12.93
P value	0.04	1.61

#### 6.4. Comparison after interventions

Table 4 was the outcome of an independent t-test comparing the two groups after intervention. The result showed that the post-intervention level of anxiety for the HCR group was 5.63 compared to 9.00 for SCR group with mean difference of 3.38 and p value was 0.02. Compared to SCR group serum cortisol level 280.25 after intervention, HCR group was 186.00. Mean difference of 93.25 with p value at 0.05.

**Table 04.** Comparison of anxiety and serum cortisol level for post intervention among HCR group and SCR group

Intervention	Anxiety level	Sr. Cortisol level
HCR group	5.63±0.63	186.00± 33.87
SCR group	9.00±1.20	280.25±14.10
Mean diff	3.38±1.32	- 93.25±36.70
P value	0.02	0.05

#### 6.5. Discussion

This pilot study showed that HCR program caused a significant reduction in anxiety and serum cortisol level. Patients in HCR group have a significant reduction of anxiety level ( $p = 0.002$ ) compared to standard cardiac rehabilitation group ( $p = 0.08$ ). These showed that mindfulness breathing which is combined with relaxation therapy by listening to Quranic verses been proven to help lower the patient's anxiety levels, thus it can greatly improve the patient's psychological health. Previous studies have also shown the effect of positive mindfulness therapy by improving patient's ability to cope with the situations by positive self-control. This can give a motivation for the patient to change their lifestyle to be more healthier and may have a good quality of life (Jalali, Abdolazimi, Alaei, & Solati, 2019).

This study is consistent with previous study by Parswani, Sharma, and Iyengar (2013) and Cho, Ryu, Noh, and Lee (2016), showed that mindfulness intervention and mindfulness breathing group significantly have a lower anxiety ( $p = 0.001$ ) compared to control group. Mindfulness breathing and relaxation therapy has been able to reduce anxiety levels among the CHD patients where it is able to promote positive emotions and positive thoughts also leading to synchronization of the heart (Cho et al., 2016; Kim et al., 2013). Studies by Witek-Janusek et al. (2008) found a decrease in serum cortisol levels among the groups undergoing mindfulness therapy compared to the control group. Similar to this study which has shown serum cortisol level reduced about  $47.12 \pm 11.15$  ( $p = 0.04$ ) in HCR group compared to SCR group which had an increase in serum cortisol level after intervention.

Although the results of this study showed that the HCR program had a positive effect on anxiety reduction, it did not show similar results for depression. The HADS scale showed not significant reduction in depression level among the patients. However, there was a slight decrease in the level of depression that

has been shown in the HCR group. Low depression levels among the patients involved in this study may have influenced the results of the study.

## 7. Conclusion

Combination of psycho education, physical exercise, mindfulness breathing and relaxation therapy by listening to quranic verses significantly effective to reduce anxiety among post angioplasty patients. Therefore, mindfulness breathing and relaxation therapy by listening to quranic verses should be considered to incorporate in standard cardiac rehabilitation program.

## References

- Akerstedt, T., & Levi, L. (1978). Circadian rhythms in the secretion of cortisol, adrenaline and noradrenaline. *Eur J Clin Invest*, 8(2), 57-58.
- Asrenee, A. B. R., Fazirah, A., Suhairi, I., & Zurkurnai, Y. (2007). Psychiatric Sequelae of Acute Coronary Syndrome in Hospital Universiti Sains Malaysia. *Australia and New Zealand Journal oh Psychiatry*, 2, 359-432.
- Babaii, A., Abbasinia, M., Hejazi, S. F., Seyyed Tabaei, S. R., & Deghani, F. (2015). The Effect of Listening to the Voice of Quran on Anxiety before Cardiac Catheterization: A Randomized Controlled Trial. *Health, Spirituality and Medical Ethics*, 2(2), 8-14.
- Burg, J. M., & Michalak, J. (2011). The healthy quality of mindful breathing: Associations with rumination and depression. *Cognitive Therapy and Research*, 35, 179–185.
- Burg, J. M., Wolf, O. T., & Michalak, J. (2012). Mindfulness as self-regulated attention: Associations with heart rate variability. *Swiss Journal of Psychology*, 71, 135–139.
- Carvalho, I. G., Dos Santos Bertolli, E., Paiva, L., Rossi, L. A., Dantas, R. A. S., & Pompeo, D. A. (2016). Anxiety, depression, resilience and self-esteem in individuals with cardiovascular diseases. *Revista Latino-Americana de Enfermagem*, 24. <https://doi.org/10.1590/1518-8345.1405.2836>
- Chang, B. H., Casey, A., Dusek, J. A., & Benson, H. (2010). Relaxation response and spirituality: pathways to improve psychological outcomes in cardiac rehabilitation. *Journal of Psychosomatic Research*, 69(2), 93-100.
- Cho, H., Ryu, S., Noh, J., & Lee, J. (2016) The Effectiveness of Daily Mindful Breathing Practices on Test Anxiety of Students. *PLoS ONE*, 11(10), e0164822.
- Delui, M. H., Yari, M., Khouyinezhad, G., Amini, M., & Bayazi, M. H. (2013). Comparison of cardiac rehabilitation programs combined with relaxation and meditation techniques on reduction of depression and anxiety of cardiovascular patients. *Open Cardiovasc Med J*, 18(7), 99-103.
- Dixon, T., Lim, L. L., & Powell, H. (2000). Psycho- social experiences of cardiac patients in early recovery: a community-based study. *J Adv Nur*, 31, 1368-1375.
- Eng, H. S., Yean, L. C., Das, S., Letchmi, S., Yee, K. S., Bakar, R. A., Hung, J., & Choy, C. Y. (2011). Anxiety and Depression in Patients with Coronary Heart Disease: A Study in Hertiary Hospital. *Iranian Journal of Medical Sciences*, 36(3), 201-206.
- Fariza., Y., & Zahiruddin, O. (2015). Validation of the Malay Version of Hospital Anxiety and Depression Scale (HADS) in Hospital universiti Sains Malaysia. *International Medicine Journal*, 2(22), 80-82.
- Gullikson, M., Burell, G., Vessby, B., Ludin, L., Toss, H., & Svardsudd, K. (2011). Randomized controlled trial of cognitive behaviour therapy vs standard treatment to prevent recurrent cardiovascular event in patients with coronary heart disease. *Arch Intern Med.*, 171(2), 134 -140.
- Huffman, J. C., Celano, C. M., & Januzzi, J. L. (2010). The relationship between depression, anxiety, and cardiovascular outcomes in patients with acute coronary syndromes. *Neuropsychiatr Dis Treat*, 6, 123–136.
- Jalali, D., Abdolazimi, M., Alaei, Z., & Solati, K. (2019). Effectiveness of mindfulness-based stress reduction program on quality of life in cardiovascular disease patients. *IJC Heart & Vasculature*, 23, 100356.

- Kim, S. H., Schneider, S. M., Bevans, M., Kravitz, L., Mermier, C., Qualls, C., & Burge, M. R. (2013). PTSD symptom reduction with mindfulness-based stretching and deep breathing exercise: Randomized controlled clinical trial of efficacy. *Journal of Clinical Endocrinology and Metabolism*, 98(7), 2984–2992.
- King, S. L., & Hegadoren, K.M. (2002). Stress hormones: how do they measure up? *Biol Res Nurs*, 4, 92–103.
- Milani, R. V., & Lavie, C. J. (2007). Impact of cardiac rehabilitation on depression and its associated mortality. *Medica Journal of Medicine*, 120, 799-806.
- Mirbagher Ajorpaz, N., Aghajani, M., & Shahshahani, M. (2011). The effects of music and Holy Quran before abdominal surgery. *Evid Basic Care*, 1(1), 63-76.
- Mustapha, M., Rani, N. S. A., Reza, M. F., Wan Daud, W. N., Ghani, M. A. A. (2016). Neurotechnological Advances in Exploring Melodic Recitation of the Noble Quran: Uncovering the Neural Circuitry in the Human Brain. In M. Kamali, O. Bakar, D. F. Batchelor & R. Hashim (Eds.), *Islamic Perspectives an Science and Technology* (pp. 229-235). Singapore: Springer.
- Nyklíček, I., Mommersteeg, P. M. C., Van Beugen, S., Ramakers, C., & Van Boxtel, G. J. (2013). Mindfulness-based stress reduction and physiological activity during acute stress: a randomized controlled trial. *Health Psychol*, 32, 1110–1113.
- Parswani, M. J., Sharma, M. P., Iyengar, S. (2013). Mindfulness-based stress reduction program in coronary heart disease: a randomized control trial. *International journal of yoga*, 6(2), 111.
- Pogosova, N., Saner, H., Pedersen, S. S., Cupples, M. E., McGee, H., Hofer, S., Doyle, F., Schmid, J. P., & Von Kanel, R. (2014). Psychosocial aspects in cardiac rehabilitation. From theory to practice. *European Journal of Preventive Cardiology*, 22(10), 1290-1306.
- Richards, S. H. L., Anderson, C. E., & Jenkinson, S. (2018). Psychological interventions for coronary heart disease: Cochrane systematic review and meta-analysis. *Eur J Prev Cardiol*, 25, 247-259.
- Rothenbacher, D., Hahmann, H., Wusten, B., Koenig, W., & Branner, H. (2007). Symptoms of anxiety and depression in patients with stable coronary heart disease: prognostic value and condideration of pathogenic link. *European Society of Cardiology*, 14, 547-554.
- Stewart, J. S., Seeman, T., John, D., & Catherine, T. (2000). Salivary cortisol measurement [Internet]. In *MacArthur research network on socioeconomic status and health*. San Francisco, C.A.
- Tacon, A. M., McComb, J., Caldera, Y., & Randolph, P. (2003). Mindfulness meditation, anxiety reduction, and heart disease: a pilot study. *Fam Commun Health.*, 26, 25–33.
- Van Son, J., Nyklíček, I., Pop, V. J. M., Blonk, M., Erdtsieck, R., & Spooren, P. (2013). The effects of a mindfulness-based intervention on emotional distress, quality-of-life, and HbA1c in outpatients with diabetes (DiaMind), *Diabetes Care*, 13, 823–830.
- Vollestad, J., Sivertsen, B., & Nielsen, G. H. (2011). Mindfulness- based stress reduction for patients with anxiety disorders: Evaluation in a randomized controlled trial. *Behavior Re- search and Therapy*, 49, 281–288.
- Wilk, C., & Turkoski, B. (2001). Progressive muscle relaxation in cardiac reha- bilitation: a pilot study. *Rehabil Nurs*, 26, 238-42.
- Witek-Janusek, L., Albuquerque, K., Chroniak, K.R., Chroniak, C., Durazo-Arvizu, R., & Mathews, H. L. (2008). Effect of mindfulness based stress reduction on immune function, quality of life and coping in women newly diagnosed with early stage breast cancer. *Brain Behav Immun*, 22, 969–981.
- Younge, J. O., Wery, M. F., Gotink, R. A., Utens, E. M. W. J., Michels, M., & Rizopoulos, D. (2015) Web-Based Mindfulness Intervention in Heart Disease: A Randomized Controlled Trial. *PLoS ONE*, 10(12), e0143843.
- Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*, 67, 361–370.