

Emotional and Cognitive Impairment among Cardiac Patients - A Narrative Review

Sarika M L¹, Sasmita Das², Suresh Kumar Behera³

¹PhD Nursing Scholar, ²Associate Dean, SUM Nursing College, ³Professor and HOD, Department of Cardiology, IMS and SUM Hospital, Siksha O Anusandhan DTU, Bhubaneswar

Abstract

Cardiovascular disease is a major group of contributing 31% of global mortality rate. The lifestyle changes are the key role to develop such diseases. The cardiovascular diseases are altering the life style practices and need to change their routine life style. There are many related co morbidities that may arise after the cardiac event. In which the emotional and cognitive co morbidities are making further risk to the subsequent cardiac event. Therefore the correct and prompt treatment is needed for the prevention of the co morbidities. The main aim of this narrative review is to find out the burden of emotional and cognitive impairment and to find out the effect of relaxation technique on the reduction of the emotional and cognitive impairment among cardiac patients. Mainly the online data sources including PubMed, PubMed central, Cochrane, Medline, Google scholar were searched for the related studies. The main emotional imbalance are depression and stress. In which depression is contributing the major role among cardiac patients. The major pathophysiological changes after myocardial infarction that lead to the emotional and cognitive symptoms are due to the reduced blood supply to brain and the anaerobic metabolism. There are different complimentary therapies are there for the management of the emotional co morbidities. In which the relaxation therapy is very useful therapy in the emotional imbalance management.

Key words: *depression, cognitive impairment, stress, Acute Coronary Syndrome, heart failure, myocardial infarction*

Introduction

Cardiovascular disease is mainly focusing on the disease of the heart and the vascular system. In this disease category include coronary artery disease, cerebrovascular disease, rheumatic heart disease, valvular heart disease, peripheral vascular diseases and other related diseases. The death due to this

disease group is making the global mortality rate into 17.9 million every year which is contributing the 31% of global death. Since the burden of the cardiovascular disease is high in which four out of five death is because of the coronary artery disease and cerebrovascular accident. In which the high incidence rate is showing in the age group of less than 70 years. While considering the death rate, it is calculated that the major portion of the death (75%) in the middle and low income countries. The major risk for the development of the cardiovascular disease are modifiable and non-modifiable risk factors. In which smoking, sedentary life style, unhealthy diet, strong

Corresponding author:

Sarika M L

PhD Nursing Scholar, SUM Nursing College, Siksha O Anusandhan DTU, Bhubaneswar

Email ID: sarikaml@soa.ac.in, Phone: 9400427506

family history, high blood pressure and lipid level etc. are contributing the major part of the cardiovascular disease risk. [1]

The death due to the coronary heart disease is increasing in developing countries and is decreasing in the developed countries. [2] The important reason behind this hike is due to the rapid changes by urbanization, industrialization and life style changes and is coming under the epidemiological transition. [3] In early 20th century the transition was emerged in developed countries and 50 years later this was affected in the developing countries also. This is the major reason for the difference in the mortality rate between the developed and developing countries. [4] The transition epidemiology mainly developing through the five stages; (a) age of pestilence and famines, here in this stage the major problems facing by the countries are the malnutrition, infectious diseases, infant mortality and childhood mortality. These were contributing approximately 90% of the mortality burden of the country, and the remaining 10 and less than 10% only contributing the cardiovascular diseases. (b) age of receding pandemics, in this stage the mortality from the communicable disease were under controlled and the cardio vascular diseases started to contribute the mortality rate approximately 35%. (c) Age of degenerative and human made disease, in this stage the mortality from the cardiovascular disease are increasing to around 65%. (d) Age of delayed degenerative diseases, by here the cardiovascular related death is decreased but still it was in the rate more than 40% of all the death. (e) Age of inactivity and obesity, here the population are in sedentary life style and lack of exercise makes the population more vulnerable to the cardiovascular disease and the related mortality. In India there could be all the epidemiological transition stages can appear. [5]

In India the coronary artery disease trend is showing among the adult population over 20 years of

age have 2 times more chance to develop the disease in rural area and 6 times more in the urban area. [6] The ischemic heart disease and stroke contributing the major cause of death (83%) in India, which is slightly higher than that of the global level. The years of life lost due to the cardiovascular death is raised to 59% from 1990 to 2010. The cardiac disease burden is 7 fold more in urban than rural. [7]

Methodology

A narrative review based on the scientific research findings used as the methodology in this study. The main study objective is to find out the burden of emotional and cognitive impairment and to find out the effect of relaxation technique on the reduction of the emotional and cognitive impairment among cardiac patients. Mainly the online data sources including Pubmed, Pubmed central, Cochrane, Medline, Google scholar were searched for the related studies. We searched for the keywords depression or cognitive impairment or stress and Acute Coronary Syndrome or heart failure or myocardial infarction for the study review. We searched the article till February 2021. The inclusion criteria includes the articles related to stress and depression among cardiac patients, cognitive impairment among cardiac patients, effect of relaxation therapy among cardiac patients and the exclusion criteria includes the articles related to other emotional among cardiac patients, effect of other complimentary therapies among cardiac patients and the articles published after February 2021.

Epidemiology of Depression after MI

Globally depression and ischemic heart disease are the second and third cause of disability, after HIV/AIDS, and in the first and second position in the developed nations. The depressive symptoms after MI is very common, in which around 16 to 27% showing within two weeks of MI. among them 75% may continue with the depressive symptoms for another 3

months too. [8] Sometimes the symptoms of depression may improve or can exacerbate after that, but still it seemed to be constant for a minimum period of 18 months after MI. [9] There are many study evidence that states that depression and stress after MI may influence the prognosis after MI. A meta-analysis on depression and prognosis of MI among 16,889 patients and they were followed for a period of 18 months. The Odds Ratio of the death due to depression among the patients with depression and without depression is 2.25 (95% CI, 1.73-2.93). Another subpart analysis on the occurrence of new cardiovascular disease, they were selected 18 studies with 10,119 patients. Among them 2247 got another incidence of MI within 2 years. The Odds Ratio of the incidence of new cardiac event among depressed and non-depressed patients was 1.59 (95% CI, 1.37-1.85). [10]

Pathophysiological Mechanism for the occurrence of depression after MI

There is no exact known mechanism for the occurrence of depression after MI. There are different mechanisms have been suggested.

Biological pathway:

Disturbance in the blood clotting mechanism in the body may damage the vascular endothelium of the coronary arteries. That leads to the activation of the immune system in the body and further develops coronary artery thrombosis. It leads to the hyperactivity of hypothalamic-pituitary and adrenocortical axis. Finally there is disturbance in the cardiac autonomic tone and lower the heart rate variability and depressive stage. [11, 12]

Behavior pathway:

The patients after the incidence of Myocardial Infarction may develop depression and few of them may less likely to adhere with the dietary modification, physical activity, adhere to medication

and may increase the smoking rate. These maladaptive behaviors may leads to the further complications and poor prognosis. [13]

Poor prognostic factors

Poor social support, living alone, socially isolated people, seriousness of the cardiac disease [14], and psychological stress at work, negative life events, irritability, and low social activity [15]

Cognitive impairment after MI

The patients with cardiac disease are commonly experiencing the physical, emotional and cognitive impairments. [16] The blood supply to the heart is reducing after the occurrence of MI and leads to the production of Reactive Oxygen Species (ROS). This ROS mainly include the Hydrogen Peroxide, which is harmful to the proteins, lipids and DNA. [17-18] The antioxidant enzymes (catalase (CAT) and superoxide dismutase (SOD)) are there in the body to counteract on the effect of ROS, but these enzymes were reducing after MI. [18]

The MI not only reducing the blood supply to the heart but also reducing the blood supply to the other vital organs also. As a result there is a reduced blood supply to the brain tissue and can progress to the cognitive impairment. [19] The cognitive impairment is relatively present among the patients with congestive cardiac failure. [20] But the patients are treating with the digoxin therapy, and it can improve the cognitive impairment. [21]

Pathophysiological mechanism of occurrence of cognitive impairment after MI

A reduced blood supply after the Myocardial Infarction cause a decreased blood flow to the brain. This may leads to the ROS production, after a long term potentiation there will be an impaired ability for learning by experience and Cell damage in the brain including hippocampus, sensitive to the ischemic

reactions. [22, 23]

Hippocampus is responsible for the cognitive functions, learning and memory. The ROS, especially the hydrogen peroxide may alter the Long Term Potentiation (LTP), which is helpful for learning by experience. The Framingham Heart Study also gives clinically the supporting evidence on the relation between the heart disease and the cognitive impairment. [20] In another MI patients study revealed that there is high in hospital mortality rate in patients with NSTEMI with mild to moderate cognitive impairment (mild- OR: 1.3, 95% CI, 1.2–1.5; moderate/severe- OR: 1.7, 95% CI, 1.4–2.0). [24]

Stress after MI

Myocardial Infarction is a life threatening condition with high prevalence. Therefore it may lead to severe distress in patient's life. The patients are complaining more emotional symptoms than the somatic symptoms. It includes, helplessness, hopelessness, emotional instability, lack of support, stress on the future management etc. These emotional instability may adversely affect the cardiac health and lead to poor prognosis. [25] While assessing related study findings it showed that the perceived stress is common among the adult population. [26-27] The associate factors are the alternations in the working status and personal life, which may negatively make an impact on the adult population when compared to the old population. [25] And also when comparing the perceived stress between the men and women, the stress is more in women than men. [28]

Management of emotional and cognitive impairment

Exercise therapy: the recommended exercise duration is 150 minutes per week which can be brisk walking, or cycling, and 75 minutes of vigorous activity (cycling) with a combination mode. [29]

Cognitive behavior therapy: Relaxation therapy, stress reduction techniques, smoking cessation, acceptance strategy, dietary management, life style modification, medication adherence, regular exercise, yoga and meditation.

Pharmacotherapy: The evidence from Randomized Controlled Trial was conducted on the effectiveness of the selective serotonin reuptake inhibitors. It was found to be effective with less cardiac side effect. The founded side effect are prolonged QT interval and interaction with other medicines. The tricyclic anti-depressants are contraindicated because of the cardiac related side effects. [29]

Supportive education: Tailored Health education on the cardiovascular disease, its risk factors, prevention, management, and secondary prevention.

Relaxation therapy

Relaxation therapy is a widely acceptable alternative therapy for the patients with psychological and cognitive imbalance. It can be range from common head ache to the related disease conditions like cancer or myocardial infarction. Relaxation is defined as “a state in which the person can maintain or attain a steady hypo metabolic level with normal smooth and striate muscle functioning in a pleasant and happy mental state”. The important stages in relaxation therapy include;

a. Effective breathing: it should be deliberate, slow, deep and abdominal breathing

b. Striate muscle relaxation: preparing the striate muscle strongly to respond at the time of fight and flight reaction. This technique is described by Jacobson, and it include the progressive muscle relaxation technique.

c. Autogenic training: in this method the relaxation of the body by mentally than physically. Luthe and Schultz introduced a shortened autogenic

relaxation method including eight mental thoughts for relax the mind.

d. Mental relaxation: here the mental relaxation after the complete physical relaxation of the body. Then the individual supposed to pass through a guided visual imaginary field. And this method can stimulate the sense organs, sight, hearing, smell, touch, and/or taste.

e. Smooth muscle relaxation: the voluntary muscle relaxation is possible by any of the above methods, but it is difficult to control the muscles under the autonomic control. So it needed the visualization or the stimulation through the sense organs that can relax the smooth muscles automatically.

f. Diet and chemical stress: food also may stimulate the stress reaction in our body. Each dietary item have its own role in maintaining the homeostasis. In which the vitamin B rich foods are more helpful in reducing the food related stress.

g. Exercise: along with all the relaxation technique the regular exercise can reduce the stress. [31]

Depression after myocardial infarction is three times more than that of general population. Around 15-20% of the patients with MI is diagnosed with the depression. The depressive symptoms among the MI patients can alter their life style and it can increase the risk of develop an another incidence of MI. [32] The depression is considered as a predictor of mortality in the early phase among the patients with MI. [33]

There are many supporting evidence that the muscle relaxation have an effect on reducing the depression. A meta-analysis on relaxation therapy for rehabilitation and prevention of ischemic cardiac disease by Dixhoorn showed that a group of similar nine study result supported that relaxation technique can reduce the depression and a group

of 13 studies showed that it can reduce the anxiety among the patients. [31] Another quasi experimental study evidence showed that the relaxation therapy is effective in reducing the depression and anxiety. [29] In studies by J A. Collins et al [32] and J A. Blumenthal et al [33] reported that there is no significant change after the relaxation technique among the coronary artery disease patients. A study by Delui et al on effect of the relaxation and meditation among cardiac patients showed that there is significant reduction of anxiety and depression after meditation than that of relaxation technique. [31]

Conclusion

The emotional and cognitive impairment among the cardiac patients have a great role in the reoccurrence of the adverse cardiac events among the cardiac patients. The routine cardiac rehabilitative therapy can reduce the related impairment up to a limit. But the evidences suggests that a patient centered cognitive behavioral therapy and alternative therapies can regulate the emotional and cognitive impairment in the maximum level.

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