

Effective cardiac rehabilitation associated with the application of music therapy

Keywords: cardiac rehabilitation, music therapy, bypass surgery, vasoregulatory responses, cardiovascular pathology, arrhythmia, physical health

Abbreviations: ANS, autonomic nervous system; SNS, sympathetic nervous system; PNS, parasympathetic nervous system; IMJ, integrative medicine Japan

Opinion

In recent years, there have been a variety of rehabilitation in the clinical practice and treatment. Among them, cardiac rehabilitation has been in focus for cardiovascular centers and hospitals.¹ The purpose of cardiac rehabilitation is to deal with optimizing physical various function in patients who has heart disease and recently received heart cardiac surgeries. Cardiac rehabilitation has been a comprehensive education, behavior and exercise modification program, which includes restoring and maintaining optimal each health, and reducing the risk of heart problems in the future.² Patients with heart problem usually enter cardiac rehabilitation after acute coronary events including myocardial infarct, coronary artery bypass surgery associated with heart failure.³ There are comparative study between home-based and center-based cardiac rehabilitation.⁴

For cardiovascular system, the cardiac autonomic nervous system (ANS) has been a crucial factor in physiological and pathological responses.⁵ ANS always regulates various functions such as heart rate, blood pressure and vasoregulatory responses in our routine lives. These regulations are involved in two axes, which are the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS). These impaired regulations such as stress, aging, organic and other causes would lead to various cardiovascular pathology. They include hypertension, arrhythmia, ischemic heart disease and congestive heart failure.⁵

Cardiovascular patients often have persistently increased sympathetic activity.⁶ This state contributes to the attenuation of parasympathetic nerve activity and the occurrence of heart failure and arrhythmia. From the above, in order to prevent the onset and progression of cardiovascular diseases, it is very important to improve the balance of the autonomic nervous system.⁶

On the other hand, there have been a category of music therapy (MT), which is one of the Integrative Medicine (IM) and Complementary and alternative medicine (CAM).⁷ IM and CAM have been developed and prevalent across the world, with a variety of treatments.^{8,9} The authors have continued various activities concerning IM and CAM as the Shikoku division of the Integrative Medicine Japan (IMJ). We are music therapists and pianists and reported the efficacy of music therapy in several opportunities.¹⁰

Among a variety of types of therapies in the category of IM and CAM, MT seemed to be one of the most popular and acceptable treatments by every person. The reason would be that it can be understood by healthy people, clients, patients with health problems and various diseases.¹¹

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As for the definition of the music therapy, there are some differences due to the situation of each country. They include Music therapy (English), Musico Therapie (French), Musik Therapie (German) and others. American Music Therapy Association (AMTA) has presented the definition of music therapy in the following:¹² Music therapy is the use of music in the accomplishment of therapeutic aim: the restoration, maintenance, and improvement of mental and physical health. It is the systematic application of music, as directed by the music therapist in a therapeutic environment, to during about desirable changes in behavior.

Regarding the both fields of cardiac rehabilitation and music therapy, topics currently attracting attention would be described in this article. Not only exercise but also the presence of the music can affect autonomic nervous system activity.

In detail, physical exercise can increase the activity of sympathetic nerve and decrease the activity of parasympathetic nerve. Those mechanisms cause increasing heart rate (HR), and afterwards HR reduction after the exercise. Like this, the rapid recovery of increased HR means a crucial mechanism for avoiding excessive heart function just after exercise. This mechanism has been from sympathetic withdrawal¹³ and also parasympathetic reactivation.¹⁴ The higher reactivation of the parasympathetic has been observed in rather trained athletes.¹⁵

On the other hand, music has been believed to include some powers in the emotional aspect and in the autonomic nervous activity. It is evaluated to be safe and economical for intervention and treatment.¹⁶ From the viewpoints of IM and CAM, these effects have been known in the music therapy. Generally, sedative music leads both increased relaxation and decreased psychological tension associated with heart rate variability.¹⁷ These efficacy would be involved in a shift of the autonomic balance for some predominance of the parasympathetic nerve.¹⁸ Furthermore, when the subjects listen to pleasant mood of music, the activity of parasympathetic nerve would be increased than the level of resting situation.¹⁹

There was a report concerning the effects of music on the activity

of autonomic nerve after exercise.²⁰ The protocol included 4 groups which are sedentary, music, bicycling and bicycling +music sessions. The evaluation was conducted by frequency analysis of HR variability. As the biomarker of parasympathetic nerve activity, high frequency power was significantly elevated in the music group.

The results would suggest that music may increase parasympathetic activity and modify its response after exercise. Consequently, music may have an efficacy of improving post-exercise parasympathetic reactivation, and may give a decrease in cardiac stress after exercise.²⁰

There have been inconsistent research results for the response of music to autonomic nerve activity.^{17,21} Their reason would be from several factors, including i) healthy subjects vs patients with diseases, ii) during listening vs after listening to the music, iii) protocol music vs favorite or chosen music, iv) listening one time or repetition, v) quiet or soft music vs rhythmical music, vi) sedentary vs active session, and so on.

As mentioned above, the research among cardiac rehabilitation, music therapy and the intervention of music would be challenging and attractive. Music has various components, such as rhythm, melody, harmony (three major factors), tempo, sound volume, various tone.²² Moreover, each subject has own favorite and familiar music, with/without of instrumental music/song. These various complexity may cause influences and difference in the activity of parasympathetic nerve associated with the situation of physical exercise.²³

It is reported that by exercising with calming music, perceived exercise intensity can be reduced and the exercise can be continued with good mood.²⁴ Therefore, applying adequate music has the possibility of smooth continuation of exercise therapy.

Finally, music therapy may become one of the standard programs for cardiac rehabilitation medicine. To that end, establishment of more appropriate methodology and accumulation of music therapy evidence would be expected in the future.

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Conflicts of interest

The authors declare no conflicts of interest.

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