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The Importance of CogCardio: Cognitive Rehabilitation in Cardiac Patients

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Abstract

Cognitive deficits pose serious challenges for cardiac patients. Various paper-pencil and computerized intervention paradigms have been developed and explored in pilot and feasibility studies. However, they are limited in scope and applicability. Therefore, there is a growing need to develop and standardize cognitive retraining activities that address all affected domains in the different cardiac conditions and ensure functional independence.

Keywords: Heart disease; Cognitive impairment; Functional capacity; Quality of life

Introduction

Heart Disease is an umbrella term which includes a range of conditions that affect the heart (Figure 1). The term cardiovascular disease which can be used interchangeably with heart disease involves the heart, blood vessels or both [1]. The causes for the same are diverse but atherosclerosis and/or hypertension have been found to be the most common ones [2].

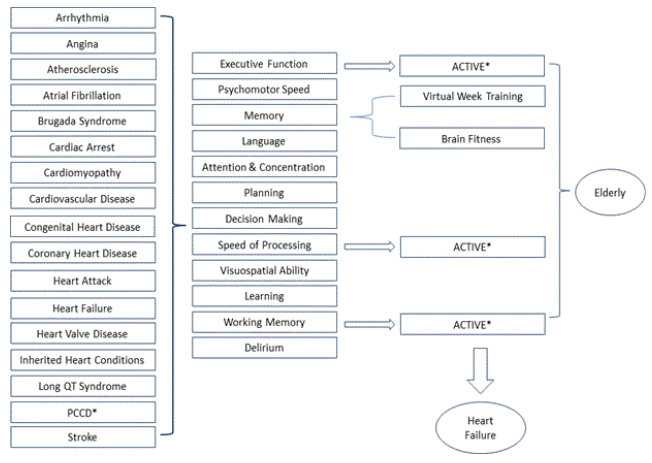

Figure 1: Showing how the studies available have targeted restricted cognitive domains in the limited population of elderly heart failure patients, Note: PCCD-Progressive Cardiac Condition Defect, ACTIVE-Advanced Cognitive Training for Independent and Vital Elderly.

The term "cardiogenic dementia" introduced in 1977 identified a link between impaired cognition and cardiac disease [3]. A number of studies since then have examined this link with different cardiac conditions [4-6]. However, some conditions still remain untouched and need to be explored. Available literature shows that most of the cognitive domains get affected as a result of cardiac conditions (Figure 1). Possible theories suggest the reason behind this link for different conditions [7]. Additionally, it has been found that other environmental and disease-related factors like dysponea and pain lower the scores on neuropsychological assessment [8]. Depression has also been found to be a co-morbid condition with heart disease thus making it an important condition to screen during initial assessment in order to eliminate the chance of underestimating neuropsychological performance [9].

The physical and cognitive demands of the illness become so complex that cardiac patients can perform fewer and fewer cognitively challenging tasks over time [10]. Cognitive impairment in cardiac patients has been associated with (a) reduced likelihood to make appropriate self-decisions, (b) decreased self-care, (c) reduced ability to make medical decisions, (d) poor compliance with medication and (f) increased associated costs [11,12]. Overall, these affect the day to day functional capacity of such patients and reduce their health-related Quality of Life (QOL).

Therefore, there is an increased need to plan efficacious interventions that not only improve cognitive functioning of the affected domains but also prevent or delay memory loss and improve instrumental activities of daily living in such patients [13].

Cognitive rehabilitation is a method of treatment of cognitive deficits that involves retraining lost or impaired function through varied activities and repeated skills practice [14]. Two main approaches to cognitive training have been investigated: (a) Strategy based training which aims to compensate for inadequate cognitive processes and (b) Process-based training which aims to restore impaired cognitive processes [7].

Different theories and models underlie these approaches. The model of adult cognitive plasticity supports the use of computerized cognitive interventions [e.g. Auditory Cognitive Training (ACT)] by stating that activities that continuously adapt to the subject's performance by adjusting task difficulty help enhance cognitive functioning [15]. Such process based cognitive retraining activities that target information processing ability result in greater cognitive improvements and wider

transfer to improved everyday functioning as compared to other approaches [16].

The information degradation theory further supports process based cognitive interventions which target perceptual information processing. This theory suggests that if the initial perceptual processes (e.g. processing speed) which later cause difficulty is higher order cognition (e.g. working memory) can be improved, then the latter can also be improved [12]. Such ACT activities may improve the brain's ability to receive, process, store and utilize auditory information which can further enhance higher order functions of attention and memory [16].

Further, data from Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study also revealed that retraining of speed of processing ability helps improve everyday cognitive performance [11]. Additionally, computerized plasticity based cognitive training intervention called Brain Fitness showed improved performance on memory [17]. Another Virtual Week Training program to rehabilitate prospective memory revealed positive results [7].

Studies with healthy controls using the above-mentioned paradigms have also revealed improved performance, QOL and high satisfaction levels with intervention [17]. Face to face and computerized cognitive training exercises have shown the efficacy of these interventions over time [13,17]. Additionally, most of these interventions have high applicability and feasibility as they can be carried out at home. In the Indian context, this is achieved by extensively training the caregivers. However, globally the concept of 'care manager' is on the rise. Care managers work directly with individual patients, helping them make lifestyle changes, monitoring their conditions, providing the necessary information and advice to promote patient empowerment and enhance self-management skills [18]. They are an integral part of an attempt to form a partnership between the patient and the health professionals. This patient empowerment approach not only forms a strong collaborative network with other health professionals but also views patients as experts of their own lives who are responsible for their own health [19], which needs to be adopted in India. Once the onus of wellbeing is on the patient, it impacts their clinical indicators in a positive way along with reducing hospitalizations and emergency care costs. Further, it gradually builds self-confidence and and motivation to make behavioural changes that impact their health [18].

Cognitive retraining interventions hold remarkable promise for not only improving cognitive functioning in cardiac patients but also transferring the training to functional outcomes. The importance of memory (especially prospective memory) and speed of processing in planning and executing daily tasks is altogether well known [11]. These abilities are based on some basic cognitive functions of attention and concentration, memory, working memory and executive function which need to be intact in order to work together to further aid individuals in carrying out everyday tasks [11].

However, the above-mentioned findings that reveal increased functional outcomes are of a limited population of elderly heart failure patients (Figure 1). Other heart conditions and cognitive domains still remain unexplored. Further, most of the studies carried out are preliminary, pilot or feasibility studies [17]. Thus, there are limited evidence-based interventions for clinicians to recommend [13]. Further, limitations are greater in the Indian context due to lack of funds and limited manpower in this field. Thus, this not only impacts the kind of home-based interventions that can be planned but also relies heavily on training caregivers to aid in the rehabilitation process. Hence making psychoeducation an essential tool not only for patients but also their caregivers.

Future Directions

It has now been established that the growing need to assess and rehabilitate cognitive impairment post cardiac conditions needs to be addressed. Interestingly, literature has also revealed different cognitive deficits as a result of different treatment options [e.g. Coronary Artery Bypass Grafting (CABG)] of heart disease [6]. Impaired QOL has also been reported in patients awaiting CABG [20] thus making perioperative assessment and rehabilitation imperative for such patients. Further, there is a need not only to use the existing paradigms [e.g. Neurogenesis and neuroplasticity [17]] to plan interventions but also to develop new paradigms keeping in mind age and other co-morbid conditions. Longitudinal studies would further help in establishing the validity of the planned interventions. Further, the impact of psychoeducation and the role of care managers can be explored in the Indian context.

Conclusion

Thus, as is obvious from the dearth of literature available, the cognitive rehabilitation aspect of heart disease has been relatively untouched. Therefore, it is becoming increasingly important to be cognizant of these consequences so that they can be monitored and rehabilitated on time to ensure holistic recovery.

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