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Review Article

The talk test—A costless tool for exercise prescription in Indian cardiac rehabilitation

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ABSTRACT

Exercise-based cardiac rehabilitation (CR) plays a vital role in improving function and preventing mortality of cardiovascular disease (CVD) patients. Outpatient (Phase II and III) CR is almost nonexistent in India because of several reasons such as time, cost, distance, education level, scarcity of resources and so forth. Cardiologists or cardiac surgeons can directly advise patients and their family members to do an optimal dose of exercise in low-resource settings, that is, rural, low-income, or low-educated patients. Talk test is a no-cost, subjective tool for exercise prescription which is gaining popularity in CR because of its simplicity. This brief descriptive review covers history, administration, physiological mechanisms, reliability and validity, and safety among cardiac patients along with limitations of the 'talk test'. This review also theoretically discusses how the talk test could be used in primary and secondary prevention of CVD. Finally, it advocates Indian CR team to use this simple validated tool as a self-monitoring tool of exercise intensity.

1. Introduction

Cardiac rehabilitation (CR) refers to the "coordinated, multifaceted interventions designed to optimize a cardiac patient's physical, psychological, and social functioning, in addition to stabilizing, slowing, or even reversing the progression of the underlying atherosclerotic processes, thereby reducing morbidity and mortality"[1] which is endorsed by the World Health Organization. It is divided into three progressive phases: Phase I (inpatient CR), Phase II (supervised outpatient CR which lasts 3–6 months), and Phase III (life-long community-based CR).[2] Ten core components of CR have been recommended by the American Heart Association (AHA) for the secondary prevention of cardiovascular disease (CVD).[3] Physical activity (PA) counseling and exercise training are the two major exercise-oriented components, which directly or indirectly affect the remaining core components.[3]

1.1. Exercise training and CR

CR, which started as early ambulation, has evolved as more structured and evidence-based comprehensive program, of which exercise training is the integral component. Exercise must be individualized—to avoid adverse effects like myocardial overloading and myocardial ischemia—for maximal benefit.[4,5] Individualized exercise prescription follows FITT principles, i.e, frequency, intensity, time, and type.[4,6] Among these, exercise intensity is the important principle for exercise prescription because of its impact on medical safety and effectiveness.[5] Various subjective and objective tools are used to determine the appropriate exercising intensity for cardiac patients.[4–6]

Objective tools such as heart rate (%), heart rate reserve (%), percentage of maximum oxygen consumption (VO_2 max [%]), and metabolic equivalent (MET) have been used successfully to monitor exercise prescription in cardiac patients.[5–7] Although these are valid and reliable means to prescribe exercise, they are relatively costly and need skill, time, and effort to master them. These limitations have led to the popularity of subjective tools for exercise prescription. Rating of perceived exertion (RPE) is the commonly used subjective tool for exercise prescription in home-based and/or

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low-resource setting CR.[5,7,8] It is usually rated through 6–20 Borg scale, where 6 means “no exertion at all” and 20 means “maximal exertion”.[9] The patient can rate from 6 to 20 depending upon the level of exertion. RPE is a validated and easy tool for exercise prescription, but it requires a scale to visualize and marking the intensity of exercise. Furthermore, factors such as familiarity with training, gender, education, and the use of diuretics and beta-blockers[10] can affect the RPE rating.[6,11] RPE is also difficult to understand for low-educated individuals[11] who are more prone to CVD in India.[12]

1.2. Why talk test in Indian CR?

Benefits of exercise-based CR has been well proven for improvements in the physical function, clinical measures of health, and health-related quality of life. They have also been shown to reduce all-cause mortality in patients with CVD.[7,13,14] Despite various benefits of exercise-based CR, a very few facilities are offering outpatient (Phase II and III) CR in India[15] with a participation rate of just 13%.[16] This underutilization of outpatient CR program might be because of the low-income group,[15,17–19] low education,[17,18] time and distance constraints,[15] and poor awareness and referral by cardiologists for CR in middle-income countries such as India.[17,20] Most of these limitations can be overcome by using simple, safe, realistic, cost-effective, home-based, and self-monitored CR programs to increase participation, adherence, and completion of outpatient CR.[15,21–25] The talk test, being a simple, easy, no-cost realistic tool for exercise prescription, can promote home-based rehabilitation which is the need of hour. So, this brief review aims to advocate its utility in low-resource Indian outpatient CR setting.

2. Talk test

2.1. History

The talk test is based on the concept used by mountain climbers in 1937.[26] The utility of the talk test, as a tool for exercise prescription, has been established in sedentary[26–32] and trained[33,34] healthy young adults.[35] It has also been shown to be useful in Phase II and III CR of cardiac patients.[36–43] The talk test is considered as a good tool to measure the intensity of day-to-day physical activities.[44] These bodies of evidence have given the recognition to the talk test in the AHA scientific statement and in the 10th edition of American College of Sports Medicine (ACSM's) guidelines for exercise testing and prescription, as the effective method of guiding exercise training.[45,46]

2.2. Method of administration

The participant is asked to speak loudly to a person adjacent to him/her while being indulged in an activity/exercise. The exercise dosage is evaluated by asking if he/she can speak comfortably. The responses are recorded categorically as comfortable (yes), difficult (yes, but…), and uncomfortable (no). Exercise at or little lower than comfortable–difficult junction (last positive [LP]) is considered as an optimal dose in CR, which is a simple and useful way of exercise prescription.[36–43,47,48] The participant's response from the talk test is well correlated with therapist observation in graded exercise test literature.[37,39,40] The talk test has been used while walking/running on treadmill,[28–34,37,41,49] cycle ergometer,[26,27,30,31,35,36,39,40,42] and track walking.[41] So, it can be easily administered in majority of day-to-day physical activities of cardiac patients. In short, a cardiac patient is exercising at safe and effective pace when he/she can able to talk comfortably, that is, at least one sentence with an exercise partner.

2.3. Physiology behind the talk test

Speech comfort is considered as the junction point between moderate and vigorous exercise.[6] This simple way of judgment of the transformation from moderate to vigorous exercise is deeply elucidated in context of physiology by Creemers et al in a recent research.[31] According to Creemers et al, reduction in breathing frequency due to speaking causes the retention of CO_2. But voluntary respiratory control system overrides the autonomic respiratory control gas exchange system, until ventilatory threshold (VT). So, the speaking is comfortable below VT or at the last positive (LP) stage of the talk test. However, above VT, excessive accumulation of lactate leads to further increase in the arterial CO_2 partial pressure (P_aCO_2) via bicarbonate buffer system.[31,50] This excessive increase in P_aCO_2 induces a high autonomic drive and increases the ventilation via chemoreceptor stimulation.[50] This disturbs the speaking comfort.[31,47,48] Fig. 1 illustrates the relationship between ventilatory threshold and speaking comfort.

2.4. Reliability and validity

The talk test is reliable in general CR[38] including ischemic heart disease,[39] myocardial revascularization[40] with intraclass correlation coefficient (ICC) value of 0.80 or more which is equal to heart rate and greater than RPE.[40] It has acceptable sensitivity to detect change in exercise capacity[39] and is well correlated with patient-perceived changes.[36] Zanettini et al[40] also reported that exercise at LP stage optimizes the training intensity in 88% of patients to the aerobic threshold level which is considered safe among cardiac patients. A recent review concluded it as a good tool for personalizing aerobic training during CR.[4] Validity of the talk test was also reported among patients who were on beta-blockers.[41]

A joint position statement of the European Association for Cardiovascular Prevention and Rehabilitation, the American Association of Cardiovascular and Pulmonary Rehabilitation, and the Canadian Association of Cardiac Rehabilitation recommends that exercise prescription for cardiac patients must be based on the ‘threshold concept’ as compared with the ‘relative percent concept’.[50] According to this concept, cardiac patients should exercise below the VT or LT level.[50] This concept is also advocated by ACSM in current guidelines for exercise prescription.[45] The talk test has been proved as the surrogate of VT or LT in cardiac patients[43] and healthy adults.[31,32,35,49] Steady-state exercise at a comfortable speech level (LP stage) is found preceding the VT.[31,32,35,43,49] These findings suggest that the talk test is a validated tool for exercise prescription in CR. Table 1 summarizes the reliability and validity of the talk test among cardiac patients.

2.5. Safety of the talk test among cardiac patients

Cardiac patients are advised to do exercise just below the ischemic threshold.[5] None of the participants reported exertional ischemia while doing exercise at the comfortable level of speech, that is, at or lower than LP stage of the talk test.[38–42] So, exercise at the comfortable level of speech (LP stage of the talk test) can be considered as safe among cardiac patients. This stage was found preceding the ischemic threshold in 84% of the participants.[42] So, this tool could also be used as the measure of exertional ischemia.

2.6. Talk test in primary prevention of CVD

Physical activity is one of the important protective factors for the primary prevention of CVD.[51,52] Dose relationship of physical activity was also established, that is, moderate level (3 to <6 MET) of occupational physical activity might reduce 10%–20% risk of CVD.[51]

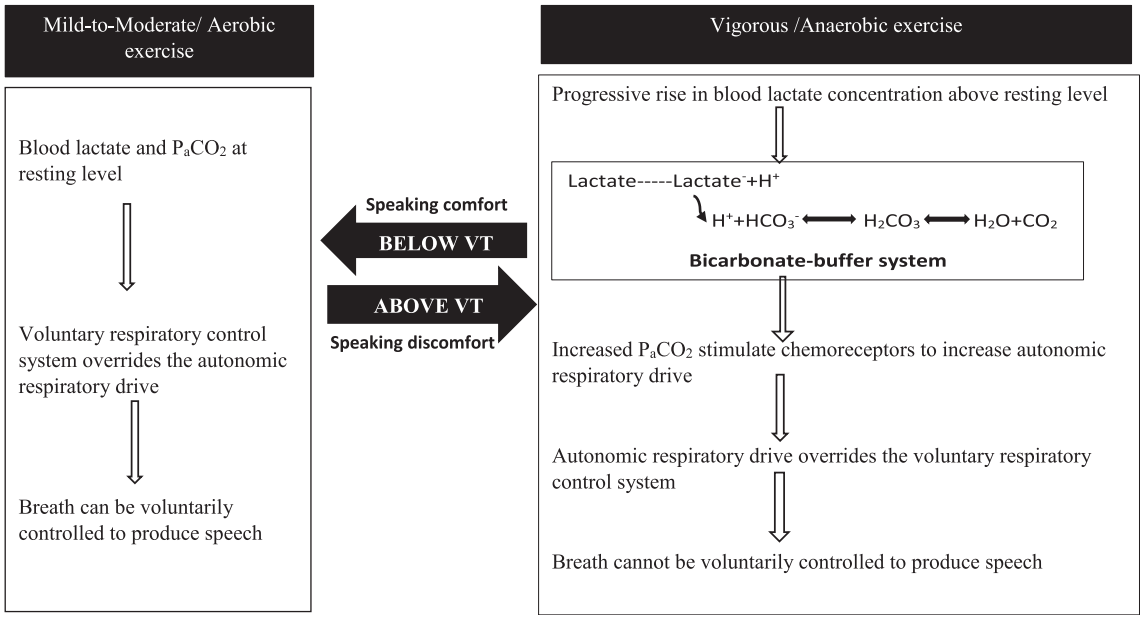

Fig. 1. Physiology behind the talk test. Below VT, the resting level of P_aCO2 allows speaking while doing exercise. Above VT, the raising level of lactate further increases P_aCO2 via the bicarbonate-buffer system. Raised P_aCO2 enhance autonomic respiratory drive and disturb the speaking comfort. VT: ventilatory threshold; P_aCO2: partial pressure of CO_2 in arterial blood.

Table 1
Reliability and validity of the talk test.

study/year	Total no. of patients	Study outcomes
Reliability		
Peterson et al[38]/2014	64 cardiac patients following CR	Intertester reliability—ICC: 0.85
Nielsen et al[39]/2014	64 IHD patients	Intrarater reliability—ICC≥0.90
Zanettini et al[40]/2013	55 patients with recent myocardial revascularization	Reliability coefficient (R) ≥0.81 for all stages of the talk test.
Validity		
Nielsen and Vinther[36]/2016	93 patients for CR	GCT-TT is responsive to change of power output after CR. Well correlated with patient perceived changes (convergent validity)
Zanettini et al[40]/2013	55 patients with recent myocardial revascularization	Comfortable level of speech (last positive stage of the talk test) optimize training intensity to aerobic threshold in 88% of patients (criterion validity).
Brawner et al[41]/2006	24 cardiac patients	Strong correlation of HR response between the talk test on a treadmill and the talk test on track ($r = 0.71$). 82% of patients were below VT when exercising at the last positive stage of the talk test (criterion validity)
Voelker et al[43]/2002	10 patients with clinically stable IHD	Strong correlation between VO_2 at VT and the last positive stage of the talk test with $r = 0.71$. (criterion validity)

CR: cardiac rehabilitation; HR: heart rate; ICC: intraclass correlation coefficient; IHD: ischemic heart disease; GCT-TT: graded cycling test with talk test; VT: ventilatory threshold; VO_2: percentage of oxygen consumption.

Exercise at a speech comfort level coincides with 3–<6MET.[6,47] Beverley et al also reported that exercise at the comfortable–difficult junction correspond with the upper limit of ACSM guidelines for healthy adults.[49] Furthermore, the talk test has been used for fitness training of sedentary healthy adults and correlated with % heart rate reserve (HRR) and RPE scores in a recent research.[27] Various studies on healthy adults recommend its use as a simple, validated tool for exercise prescription,[33,34] who do not require prior exercise testing.[28,48,49] The talk test could be used to prescribe or specify physical activity/exercise doses for the susceptible population, that is, the first degree family members of cardiac patients as primary prevention strategy.

2.7. Talk test in secondary prevention of CVD

Home-based CR can be strengthened by empowering the patient for self-management. Self-regulatory nature of talk test can empower patients for self-management. In addition, it does not require any expense and expertise which further enhances its utility in home-based rehabilitation. It has been recommended by the AHA as a relatively simple and safer way of exercise intensity prescription among cardiac patients.[46] In published literature, the talk test has been used in Phase II and III of CR to monitor exercise intensity.[36–43] The literature recommends that the speech comfort level of aerobic activities such as walking/running/cycling is feasible, safe, convenient, and corresponds with exercise recommendation for cardiac patients for secondary prevention of CVD.[6,46,50] The talk test can be easily explained by cardiologists or physiotherapists on the out-patient department (OPD) visit to quantify the doses of PA/exercise which can be more beneficial to changing the exercise behavior of the CVD patients than simply advising them to be physically active. Various reviews have also recommended it as a simple, reliable, valid, inexpensive, realistic, and safer way of exercise intensity prescription among patients with CVD.[4,47,48] Therefore, the 'talk test' can be used as a self-intensity regulator for secondary prevention of CVD in home-based rehabilitation.

2.8. Limitations and future scope

First, Petersen et al reported low–weak absolute reliability of the talk test in CR, but relative reliability was high with an ICC value of 0.85.[38] Second, large HRR (>20%) variability as against the talk test in CVD patients questions its safety in unsupervised CR.[41] Third, talk test–based studies have either been conducted in a laboratory or under a supervised exercise setting in the published literature. It has not been used as a self-regulatory intensity monitoring tool at a community level by either healthy individuals or cardiac patients. Irrespective of these limitations, it has been endorsed by the AHA and ACSM as a simple, safe, and effective tool for self-monitoring of exercise among cardiac patients and in healthy adults.[45,46] So, our recommendation of the talk test for cardiac patients is not a hyperbolic statement but is supported by many researches and reviews.[4,36–48] As it has not been used by cardiac patients at the community level and there is no literature from India about its usage, future studies should focus on its use in abovementioned circumstances, particularly from India, so that it can be established as a reliable tool to prescribe unsupervised physical activity for low–moderate risk cardiac patients.

3. Conclusion

Simple tasks such as speaking comfort can easily be understood by low-resource, low-educated cardiac patients. This may easily and safely be used in self-lifestyle management as primary and secondary rehabilitation in a modest economic country such as India. This simple, no-cost tool for exercise prescription should be researched extensively so that it can be used as an alternate to other sophisticated and relatively costly objective tools.

Key message: The talk test is a simple and evidence-based exercise intensity measuring tool and may be used in Indian home-based cardiac rehabilitation.

Conflicts of interest

All authors have none to declare.

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Appendix A. Supplementary data

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