Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Abstract: Reviews

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Future Potency of Remote Cardiac Failure Rehabilitation: A Systematic Review and A Meta-Analysis of Randomized Clinical Trials

Theresia Feline Husen[1], Putri Amadea Gunawan[1], Ruth Angelica[1], Ilona Nathania[1]

[1]Faculty of Medicine, University of Indonesia, Depok, Indonesia

Background and aims: Cardiac failure, one of the most prominent diseases with 64.34 million cases, needs regular rehabilitation. However, undergoing center-based rehabilitation might be difficult due to distance barriers and also made worse with the pandemic era. Hence, made a significant decrease in patient compliance. Therefore, this review aims to evaluate the efficacy of cardiac failure telerehabilitation as an alternative to center-based rehabilitation.

Methods: Registered to PROSPERO, following the PRISMA framework, the literature search was performed in several databases (PubMed, Scopus, Cochrane, EBSCOHost, Wiley, ProQuest, and Embase) from 2012 to 2022. In addition to selecting RCTs systematically, with critical appraisal assessed using Cochrane RoB 2. We analyzed pooled mean difference (MD) and its p-value using random effects models, as well as subgroup analysis.

Results: This review yielded 20 RCTs studies with a total sample of 2,445 patients. Telerehabilitation demonstrates better efficacy in improving patients' functional capacity compared to standard treatment for cardiac failure patients. This is validated through two subgroup analysis including 6-minute walk test (6MWT) [(MD): 35.17 ($p<0.00001$; 95%CI: 20.12-50.22)] and peak oxygen uptake (pVO2) [(MD): 1.94 ($p=0.03$; 95% CI: 0.20-3.67)]. It also increases patients' quality of life which was validated using the Minnesota Living with Heart Failure Questionnaire subgroup analysis (MLHFQ) [(MD): -7.16 ($p=0.0002$; 95% CI: (-10.87)-(-3.44))].

Conclusion: Telerehabilitation is a better alternative to standard care with better outcomes in improving functional capacity and quality of life in cardiac failure patients. We recommend the possible widespread use of this method for a better prognosis in cardiac failure patients.

Keywords: 6MWT, Cardiac Failure, pVO2, MLHFQ, Telerehabilitation

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

High-Intensity Interval Exercise versus Moderate-Intensity Continuous Exercise on Improving Cardiopulmonary Capacity and Left Ventricle Function in Heart Failure with Reduced Ejection Fraction: A Meta-Analysis of Randomized Control Trial

Alif Hakim Alamsyah[1], Putu Teja Prawitha Pinatih[1], I Nyoman Wiryawan[2]
[1]Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia
[2]Department of Cardiology and Vascular Medicine, Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia

Background and aims : Previous studies have suggested that exercise improves quality of life in heart failure with reduced ejection fraction (HFrEF) patients. But it is not clear which exercise is best to improve different aspects in these populations. To evaluate high-intensity interval exercise (HIIE) versus moderate-intensity continuous exercise (MICE) on improving cardiopulmonary capacity and left ventricle (LV) function in HFrEF patients.

Method: We searched PubMed, ScienceDirect, ProQuest, and Cochrane Library for randomized controlled trials evaluating the effects of HIIE versus MICE in HFrEF populations. All English language article that related to this topic was included with no time limit. The primary outcome is cardiopulmonary capacity. The secondary outcome is LV systolic and diastolic function. Data analysis was performed using Review Manager Version 5.4.

Result: Nine studies met the criteria. 450 patients were eligible, 13 patients (6 in HIIE; 7 in MICE) were withdrawn due to exercise-related adverse events. 437 patients were included. On cardiopulmonary capacity, HIIE improved Vo2 peak compared to MICE (1.84; 95%CI: 0.31-3.37; p=0.02) but showed no difference in VE/VCO2, maximal HR, and RER at Vo2 peak. On LV systolic and diastolic function, HIIE improved LVEF (1.96; 95%CI: 0.79-3.13; p= 0.001); LVEDD (-1.99; 95%CI: (-3.58) -(-0.40); p=0.01); and E (6.2; 95%CI: 0.66-11.74; p=0.03) but showed no different on LVEDV, LVESV, LVESD, A and E/A.

Conclusion: Compared to MICE, HIIE showed a better improvement in cardiopulmonary capacity and LV function parameters in HFrEF patients. Further studies in larger population are required to validate this study**.**

Keywords: high-intensity interval exercise, moderate-intensity interval exercise, heart failure.

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Combining Preductal-Postductal Oxygen Saturation And PeripheralPerfusion Index (PPI) To Prevent Pulmonary Arterial Hypertensionas Early Detection of Congenital Heart Disease

Alfian Noor Hakim Kusumawan

Public Safety Center 119 Yogyakarta Emergency Service

Background and aims : Congenital heart disease (CHD) is 1 of the most frequently diagnosed congenitaldisorders afflicting approximately 0.8% to 1.2% of live births worldwide. A common complication of congenital heart disease is a Pulmonary arterial hypertension (PAH). Pulse oximetry was introduced into clinical practice in the early 1980s. However, despite widespreaduse espesially during covid-19 pandemi, many healthcare providers are unaware of pulse oximetry as a early screening tool for congenital heart disease. This study was to evaluate the role of the pulse oximetry screening associated withcombining preductal-postductal oxygen saturation and PPI for the early detection of congenitalheart disease
Methods : This study is a literature review of scientific manuscripts and scientific articles on pulse oximetry screening (POS) which focused for early detection of CHD
Result : Pulse oximetry screening (POS) has a high specificity (99.9%, CI 99.7–99.9) and a moderate sensitivity (76.5%, CI 67.7–83.5) in early detection of CHD. Pulse oximetry screening (POS) has a high specificity (99.9%, CI 99.7–99.9) and a moderate sensitivity (76.5%, CI 67.7–83.5) in early detection of CHD .
Conclusion : The best result was obtained by combining Preductal-postductal oxygen saturation and PPI for CHD early screening as PAH prevention method

Keyword: Pulse oximetry screening, Preductal-Postductal Oxygen Saturation, Peripheral Perfusion Index, Pulmonary Arterial Hypertension, Congenital Heart Disease

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

The Association Between Shift Work And C-Reactive Protein Levels: A Systematic Review And Meta-Analysis

Amri Adhyatma[1], Muhammad Reyhan Hadwiono[1]
[1]Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

Background and aims: In modern society, shift work has become more prevalent due to its economic and social demands. Furthermore, shift workers experienced sleep deprivation and circadian rhythm dysregulation that have been reported to be associated with C-reactive protein (CRP), an inflammatory marker associated with cardiometabolic diseases. However, the results of such studies remain inconsistent. To evaluate the association between shift work and C-reactive protein levels.
Method: PubMed and Google Scholar databases were searched from inception to April 2022 for epidemiological studies evaluating CRP levels among shift workers, compared with non-shift workers. The mean differences in CRP levels were combined in a random-effects model expressed as pooled mean differences and a 95% confidence interval (95% CI). Analysis was performed using RevMan version 5.4.
Result: We included 6 studies, comprising a total of 906 workers. The mean CRP levels was higher in the shift worker group compared to the non-shift worker group (mean difference of 0.57 mg/L, 95% CI 0.34–0.79, $p<0.0001$, $I^2=46\%$).
Conclusion: There is limited research evaluating the impact of shift work on CRP levels. Our findings suggest that shift work is associated with an increase in CRP levels.

Keyword: shift work, CRP levels

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Effect Of Loaded-Inspiratory Muscle Strength Training On Blood Pressure In Above-Normal Blood Pressure Patients: A Meta-Analysis

Eka Prasetya Budi Mulia [1], Dita Aulia Rachmi [1], Meity Ardiana [1]

[1] Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Airlangga – Dr. Soetomo General Hospital, Surabaya, Indonesia

Background and aims : Cardiorespiratory limitation is a common hallmark of cardiovascular disease and a key component of pharmacological and exercise treatments. Inspiratory muscle strength training (IMST) demonstrates many beneficial outcomes in many cardiovascular populations, which may benefit blood pressure (BP) reduction. To evaluate the effectiveness of loaded-IMST on BP reduction in **above-normal BP patients**.

Methods: Searches for randomized controlled trials (RCT) were performed in PubMed, ScienceDirect, and Scopus. Studies in **above-normal BP patients** were included without population restriction, comparing IMST to no treatment, placebo, or active (sham) control. Change in post-training systolic BP (SBP) and diastolic BP (DBP) from baseline was used for analysis. The standard deviation of changes, when not provided, was calculated using a correlation coefficient. PEDro scale was used to evaluate the methodological quality of included studies.

Results: Four high methodological quality RCTs with 111 patients were included. Mean age range is 50–68 years. IMST targeted maximum inspiratory pressure using low (n=2), moderate (n=1), and high intensity (n=1), but the protocols varied considerably (duration: 6-8 weeks, frequency: 6–14 times/week, time: 5–30 mins) with a varied training device. Random-effect model revealed significant SBP reduction with IMST (MD= -10.65 [95%CI: -17.68 to -3.62],p=0.003; I^2=99%,p<0.001). IMST also reduced DBP compared to control (MD=-5.13 [95%CI: -9.01 to -1.26],p=0.009; I^2=94%,p<0.001). Subgroup analysis in hypertensive patients also demonstrated similar results in SBP (MD=-12.74 [95%CI: -17.73 to -7.75],p<0.001) and DBP (MD=-7.04 [95%CI: -8.64 to -5.44],p<0.001) reduction.

Conclusion: Loaded-IMST has a positive effect on BP reduction in above-normal BP patients.

Keywords: Inspiratory muscle strength training, breathing exercise, blood pressure, hypertension, cardiorespiratory.

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

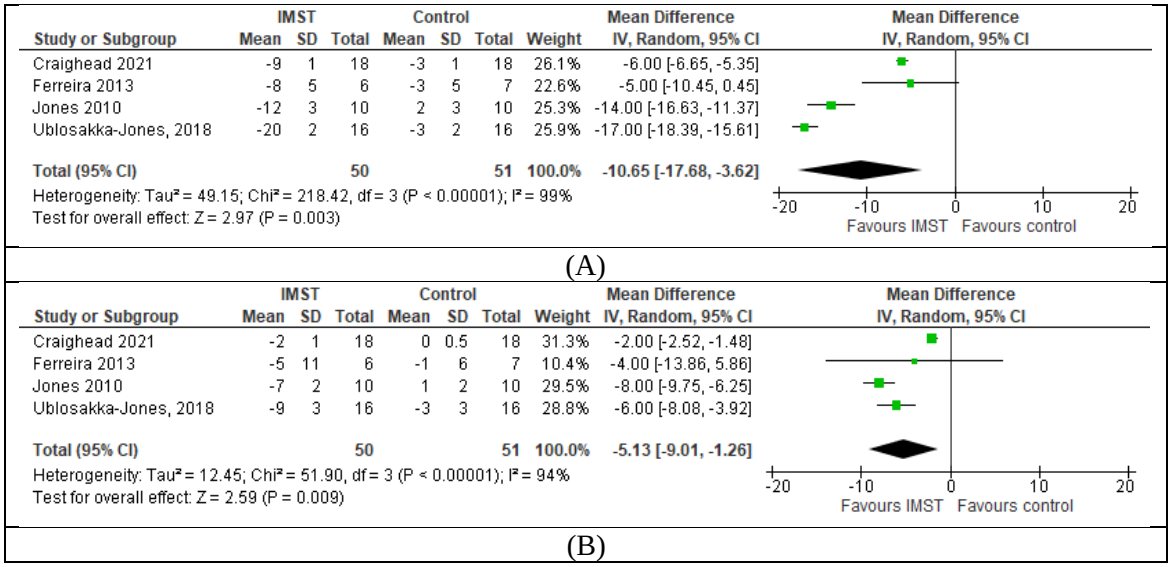

Figure 1. Effect of loaded inspiratory muscle strength training on (A) systolic blood pressure and (B) diastolic blood pressure reduction in above-normal blood pressure patients.

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Coenzyme Q10 or Ubiquinone as Adjunctive Treatment for Patients Who Require High-Intensity Statin: A Systematic Review and Meta-Analysis about the Benefit of Coenzyme Q10 in Prevention and Treatment of Statin-Associated Muscle Symptoms

Ricardo Adrian Nugraha[1], Tony Santoso Putra[1], Bagus Putra Dharma Khrisna[1], Meity Ardiana[2]
[1] Department of Cardiology and Vascular Medicine, Faculty of Medicine Universitas Airlangga – Dr. Soetomo Academic General Hospital, Surabaya
[2] Division of Cardiovascular Prevention and Rehabilitation, Department of Cardiology and Vascular Medicine, Faculty of Medicine Universitas Airlangga – Dr. Soetomo Academic General Hospital, Surabaya

Background and aims : Statin, even at high intensity, are usually well-tolerated. However, few patients complained statin-associated muscle symptoms (SAMS). SAMS are important because they result in dose reduction or statin discontinuation, as consequence has higher incidence of cardiovascular events. Since statins block mevalonate synthesis, they lower levels of ubiquinone, an essential compound for mitochondrial energizers. On the other hand, there is lack of evidence suggesting supplementation of Coenzyme Q10 (CoQ10) or ubiquinone might be beneficial in the prevention and treatment of SAMS. This study will critically evaluate the published literatures on the efficacy and safety of CoQ10 or ubiquinone supplements in the prevention and treatment of SAMS.
Methods : We performed meta-analysis. Literatures were searched from Medline, Embase, and Cochrane were searched from inception till June 2022. to identify RCTs investigating the effect of CoQ10 on SAMS. We calculated the pooled weighted mean difference (WMD) using fixed-effect model to assess the effects of CoQ10 supplementation on SAMS. The publication bias was evaluated by funnel plot and Egger regression test. Statistical analysis was performed using RevMan (version 5.4.1).
Results : Several studies demonstrated that Coenzyme Q10 presence in other cellular membranes and in blood plasma. Fourteen studies with a total of 623 participants were included in the meta-analysis. CoQ10 supplementation improves SAMS symptoms (WMD, −1.79; 95% CI, −2.21 to −1.09; $p<0.001$). Compared with the statin-alone group and the statin plus omega-3 fatty acids group, statin plus CoQ10 had significantly less myalgia ($p = 0.002$; $p = 0.007$, respectively).
Conclusion : Multiple pathophysiological mechanisms may contribute to SAMS and myotoxicity such as energy starvation. CoQ10 is vital component of the mitochondrial respiratory chain. CoQ10 or ubiquinone supplementation ameliorated SAMS, implying that this supplementation might be a complementary approach to high-intensity statin treatment.

Keywords: coenzyme Q10, high intensity statin, statin-associated muscle symptoms, ubiquinone

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

The Performance of Artificial Intelligence-enhanced Electrocardiogram in Detecting Left Ventricular Systolic Dysfunction in the General Population: a Systematic Review and Meta-Analysis

Putu Teja Prawitha Pinatih[1], Alif Hakim Alamsyah[1], I Made Putra Swi Antara[2]

[1]Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia

[2]Department of Cardiology and Vascular Medicine, Faculty of Medicine,

Udayana University, Denpasar, Bali, Indonesia

Background and aims : Heart failure (HF) remains a major health problem globally. Previous studies have demonstrated considerable benefits in treating the early stages of HF, known as asymptomatic left ventricular dysfunction (ALVSD). However, diagnosing ALVSD in the general population is difficult. Recent studies have developed AI models which perform an automated interpretation and predict the probability of systolic dysfunction in a large population from ECG data alone. To summarize the diagnostic performance of AI-enhanced ECGs in detecting LVSD in the general population.

Methods : We systematically searched literature from the electronic medical database. Included studies were assessed for quality, and data regarding study characteristics and diagnostic accuracy were extracted. Statistical analysis was performed using a bivariate, random-effects model to estimate the pooled sensitivity, specificity, and area under the curve. Meta-regression was performed to assess the effect of covariates.

Results : 8 studies including 78,084 subjects from 6 different countries were included in the qualitative review and meta-analysis. Pooled sensitivity is estimated to be 0.80 (95% CI 0.68-0.89) and specificity 0.87 (95% CI 0.79-0.92). The summary area under the curve (AUC) is 0.91 (95% CI 0.88-0.93). Meta-regression analysis found that for specificity, the prevalence of disease, population-based study, neural networks used, and the EF cutoff to be significant covariates ($p < 0.05$). No significant covariate was found in the meta-regression for sensitivity.

Conclusion : AI-enhanced ECG is accurate in detecting LVSD in the general population. Further studies are required to validate these neural networks in different populations.

Keywords: artificial intelligence, electrocardiogram, left ventricular systolic dysfunction

Indonesian Journal of Cardiology
Indonesian J Cardiol 2022:43:suppl_B
pISSN: 2830-3105 / eISSN: 2964-7304
doi: 10.30701/ijc.1422

Effect of Daily Dietary Sodium Restriction in Ambulatory Heart Failure Patients: A Systematic Review and Meta-analysis

Daniel Sukmadja[1], Rizkan Triatmaja[2], Tinanda Tarigan[3], Saiful Hidayat[4]
[1]Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

[2]Faculty of Medicine, Universitas Muhammadiyah Yogyakarta, Indonesia

[3]Faculty of Medicine, Universitas Diponegoro, Semarang, Indonesia

[4]Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

Background and aims : Daily restriction of sodium diet has been recommended to prevent adverse outcomes in heart failure patients. However, recent trials showed that dietary intervention to reduce sodium intake did not reduce the incidence of clinical events in ambulatory heart failure patients.

This study aims to measure the effect of daily dietary sodium restriction on the outcome of ambulatory heart failure patients.

Methods : Randomized controlled trials (RCTs) were obtained from Pubmed, MEDLINE, Proquest, Cochrane Library dan Google Scholar databases, with publication year ranging from 2000-2022. Studies that observed ambulatory heart failure patients and intervened with restriction of daily sodium intake of maximum of 3 grams were included. We analyzed rehospitalization and all-cause mortality number as the primary endpoint with systolic blood pressure, brain natriuretic peptide (BNP) level, and weight loss as the secondary outcome.

Results : 14 RCTs with 3397 patients were included in this study. It was found that daily sodium intake restriction significantly contributed to all-cause mortality (RR: 1.78; 95% CI: 1.49 to 2.14; p<0.001) and elevated BNP level (mean difference: 203.35; 95% CI: 184.12 to 222.58; p<0.001) compared with usual sodium intake. It was showed no significant difference in rehospitalization (RR: 1.10; 95% CI: 0.73 to 1.66; p=0.64), weight loss (mean difference: -0.57; 95% CI: -2.17 to 1.03; p= 0.48), and SBP (mean difference: -3.70; 95% CI: -9.15 to 1.75; p=0.18) parameters.

Conclusion: In ambulatory heart failure patients, sodium restriction of maximum 2-3 grams daily is related to the increased number of all-cause mortality and BNP level.