

# Pengaruh Latihan Fisik Para Komando Terhadap Remodelling Ventrikel Kiri Pada Populasi Pasukan Khusus TNI Angkatan Udara = The Effect of Commandos' Physical Training on Left Ventricular Remodelling of the Indonesian Air Force Elite Soldier

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## Abstrak

Latar Belakang : Remodelling otot jantung terkait latihan fisik merupakan mekanisme adaptasi fisiologis tubuh terhadap beban jantung yang meningkat. Tipe/karakteristik, intensitas, dan durasi latihan menentukan besarnya beban jantung dan berpengaruh terhadap pola dan tingkat remodelling otot jantung. Didapatkan pola remodelling yang berbeda antara tentara dengan atlet atau orang biasa. Pada tentara, intensitas latihan fisik yang diterima lebih berat dibandingkan atlet maupun orang biasa, dengan durasi kumulatif yang lebih lama, serta beban volume dan pressure overload yang diterima lebih besar. Selain itu, tentara juga menghadapi stresor psikis yang tinggi, serta waktu istirahat/recovery pasca latihan yang berbeda dibandingkan dengan atlet maupun orang biasa.

Tujuan : Untuk melihat pengaruh latihan fisik Para Komando dengan terjadinya remodelling ventrikel kiri baik fisiologis maupun patologis pada populasi Pasukan Khusus TNI Angkatan Udara dibandingkan latihan fisik reguler

Metode : Studi ini merupakan studi observasional potong lintang. Remodelling otot jantung pasukan khusus TNI Angkatan Udara yang menjalani latihan fisik Para Komando dibandingkan dengan anggota militer yang menjalani latihan fisik reguler. Parameter remodelling otot jantung yang dinilai antara lain Left Ventricular Mass Index (LVMI), fungsi ventrikel kiri (Left Ventricular Ejection Fraction/LVEF Biplane dan Global Longitudinal Strain/GLS), dan Myocardial Work (Global Constructive Work, Global Waste Work, Global Work Index, Global Work Efficiency).

Hasil : Terdapat 43 orang pasukan khusus yang menjalani latihan fisik Para Komando dan 43 orang anggota militer yang menjalani latihan fisik reguler. Kelompok pasukan khusus yang menjalani latihan fisik Para Komando memiliki usia yang lebih tua dibandingkan dengan anggota militer yang menjalani latihan fisik reguler, 27 (23-30) vs 20 (20-26) tahun  $p < 0.001$ . Setelah dilakukan analisis multivariat dengan memperhitungkan faktor usia, pada kelompok latihan fisik para komando dibandingkan dengan latihan fisik reguler didapatkan hasil LVMI  $79,67 \pm 18,5$  vs  $79,64 \pm 13,1$  g/m<sup>2</sup>,  $p = 0.993$ ; LV GLS  $-21$  ( $-16$  s.d  $-25$ ) vs  $-19$  ( $-15$  s.d  $-22$ )%,  $p = 0.003$ ; LV GWI  $1843,8 \pm 239,7$  vs  $1800,5 \pm 258,6$  mmHg%,  $p = 0.464$ ; LV GCW  $2140,4 \pm 257,4$  vs  $2111,1 \pm 273,8$  mmHg%,  $p = 0.619$ ; LV GWW  $41$  ( $12-152$ ) vs  $52$  ( $18-117$ ) mmHg%,  $p = 0.009$ ; LV GWE  $97$  ( $94-99$ ) vs  $97$  ( $93-99$ )%,  $p = 0.002$ .

.....Background: Cardiac muscle remodelling related to physical exercise is a physiological adaptation mechanism as a response to cardiac load. Type, characteristic, intensity, and duration of exercise determine the magnitude of the cardiac load and affect the pattern and rate of remodelling of the heart muscle. Different remodelling patterns were found between soldiers and athletes or ordinary people. In soldiers, the

intensity of physical exercise is heavier than that the athletes or ordinary people, with a longer cumulative duration, greater volume and pressure load. In addition, soldiers also faced with high psychological stressors, as well as different recovery times after training compared with athletes and ordinary people

**Objective:** To observe the effect of the Commandos' physical training on the occurrence of physiological or pathological left ventricular remodelling in Airforce Elite Soldiers compared to regular physical exercise.

**Methods:** This study is a cross sectional observational study. Cardiac remodelling of elite soldiers who underwent Commandos' physical training compared to regular troops who underwent regular training. The heart muscle remodelling parameters being assessed include Left ventricular Mass Index (LVMI), Left Ventricular Ejection Fraction/LVEF Biplane, Global Longitudinal Strain/GLS, and Myocardial Work (Global Constructive Work, Global Waste Work, Global Work Index, Global Work Efficiency).

**Results:** There were 43 elite soldiers who underwent Commandos' physical training and 43 regular troops who underwent regular training. The elite soldiers group had an older age compared with regular troops, 27 (23-30) vs 20 (20-26) years  $p < 0.001$ . After doing a multivariate analysis taking into account the age factor, in the group of Commandos' physical training compared to regular physical exercise, the LVMI results are  $79,67 \pm 18,5$  vs  $79,64 \pm 13,1$  g/m<sup>2</sup>,  $p = 0.993$ ; LV GLS  $-21$  (-16 s.d -25) vs  $-19$  (-15 s.d -22)%,  $p = 0.003$ ; LV GWI  $1843,8 \pm 239,7$  vs  $1800,5 \pm 258,6$  mmHg%,  $p = 0.464$ ; LV GCW  $2140,4 \pm 257,4$  vs  $2111,1 \pm 273,8$  mmHg%,  $p = 0.619$ ; LV GWW  $41$  (12-152) vs  $52$  (18-117) mmHg%,  $p = 0.009$ ; LV GWE  $97$  (94-99) vs  $97$  (93-99)%,  $p = 0.002$ .

**Conclusions:** The Commandos' physical training is associated with better echocardiographic result compared to regular physical exercise, indicated by higher LVEF, LV GLS, GWE, and lower GWW value