

**C47**

**Vidhi Parikh MBBS**

Advisor(s): Sarita Dhuper M.D.

Co-author(s): Sunaina Saharan, Asma Niazi, Sarita Dhuper

**To validate the utility of a modified step test and appropriate criteria for HRR that correlates best with fitness levels for children of all age groups and body mass index.**

The step test has been widely used to assess cardiorespiratory fitness (CRF) in children, a key indicator of cardiovascular health. It correlates well with the gold standard of Vo2 max assessment. Post-exercise heart rate recovery (HRR) is related to CRF and autonomic function. However, no accepted standards exist for assessing HRR in a step test across all ages and BMI.

Aim: To validate a modified step test to identify appropriate HRR criteria that correlate with fitness levels across age groups and BMI.

Methods: Patients referred to cardiology and obesity outpatient clinics underwent a modified step test with HRR calculated using:

Formula 1 (mean HR during 1 min 5 sec post-exercise) and Formula 2 (peak HR at test end - HR at 1 min post-exercise). Fitness categories (poor to excellent) were created using validated protocols. Data analysis and ANOVA modeling assessed fitness level correlations with BMI percentiles (0 ≤ 95th, 95th–120th, 120th–140th, >140th), age, and gender using SAS 9.4. Group comparisons used Tukey test. Vo2 max was derived using:

$$V_{O2max} = 22.246 + 0.343*(HRR-1min) + 11.722*(SEX) \text{ ml/kg/min}$$

Results:

123 patients (46% female), mean BMI 31.8 (SD 8.9), mean age: 14.5 (SD 3.73)

Fitness levels by formula:

Formula 1: Excellent (18%), Good (23.8%), Sufficient (18.85%), Poor (39.34%) (n=122).

Formula 2: Excellent (9.9%), Good (37.2%), Moderate (33.1%), Poor (19.83%) (n=121).

Formula 1 (mean post-HRR for 1 min 5 sec) correlated significantly with BMI percentiles ( $p < 0.005$ ), showing lower fitness with increasing BMI percentiles. Age and gender did not alter model significance ( $p < 0.002$ ), which was driven by BMI, with significant differences between groups 0 and 1 vs. 2 and 3.

Conclusion: Mean HRR for 1 min 5 sec post-step test is a better surrogate marker than HRR at 1 min for assessing fitness in children across all ages, genders, and BMI categories. This supports recording HRR in clinical practice for cardiovascular risk assessment and prognosis.